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DISEASES DUE TO PROTOZOAN PARASITES.

SERGENT (E.) & DONATIEN (A.). **Les Stomoxes, propagateurs de la trypanosomiase des dromadaires.** [Stomoxys, the Transmitting Agents of Trypanosomiasis of the Dromedary.]—*Compt. Rend. Acad. Sci.* Paris. 1922. Feb. 20. Vol. 174. No. 8. pp. 582–584.

The authors' experiments have shown that in the dromedary trypanosomiasis can be spread by the direct method by flies of the genus Stomoxys. The paddock in which the observations were made had been used for dromedaries before without any extension of trypanosomiasis from diseased to healthy being observed. In 1920, however, Stomoxys, and Stomoxys only, were found there. These flies were noted to go from animal to animal and bite before settling down to a full meal of blood.

Parallel experiments were carried out with guinea-pigs. Flies failed to transmit the trypanosome from the diseased to healthy guinea-pigs when intervals of from one day onwards intervened between the bites. When, however, the flies were transferred direct from the infected to the healthy guinea-pigs, six out of twelve became infected.

No evidence of development of trypanosomes could be found in the flies.

CROSS (H. E.) & PATEL (P. G.). **A Note on the Transmission of Surra by Ticks.**—*Depart. of Agric., Punjab, Veterinary Bull. No. 6.* 1921. pp. 1–3.

The authors have come to the conclusion that the spread of surra cannot be confined to winged and comparatively short-lived flies. This conclusion is based upon the following observations :—

1. Surra breaks out frequently in the same district and stables, though, so far as can be ascertained, the disease has not been imported into that district.

2. In one outbreak of surra the disease first made its appearance among ponies kept in a certain stable. For two years this stable was not used ; two years later, when ponies were again placed in it, cases of surra appeared.

The ponies were, so far as could be discovered by enquiries, perfectly healthy when placed in the stable, and had not come from an infected area. Further, no animals were known to be suffering from surra in

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the vicinity of the stables at the time the ponies were imported. The authors conclude from this that if the infection was not contracted while the animals were at work, they must have acquired the infection from some reservoirs of the disease which had survived for two years.

Up to the present the only species of Ornithodorus recorded in India are *O. lahorensis* (in the Punjab) and *O. savignyi* in Gujerat, Bombay, Central Provinces and Madras. Cross, however, has found a species resembling *O. lahorensis* in large numbers in the Murree Hills. This tick has been identified by BRUMPT as a new species, *O. crossi*. It was with this tick, and in a few cases with *O. lahorensis* also, that the experiments indicated in this paper were carried out.

The ticks were fed upon camels showing numerous trypanosomes in their blood, and of these some were interrupted in their feed and placed upon healthy animals within 1–20 minutes to finish, while others, having completed their feed, were placed upon healthy animals after intervals ranging from 5–22 days. Those which had had their feed interrupted were placed upon healthy animals after an interval of 34 days. In no case was surra transmitted.

When tested after 46 days the ticks which had completed their meal again gave negative results.

After 67 days, 42 ticks, comprising both those which had completed their meal and those which had not, together with two specimens of *O. lahorensis* which 22 days previously had fed upon an infected animal, were fed upon a healthy rabbit. Ten days later trypanosomes were found in the blood.

After a further 16 days, 36 of the *O. crossi* were again fed on a clean rabbit, and the two *O. lahorensis* were fed, at 14 days' interval, on a white rat. The rabbit showed trypanosomes on the 11th day and the rat was negative up to nine weeks.

The ticks were fed after a further interval of 18 days on a healthy rabbit, and eight days later trypanosomes were discovered.

The seasonal occurrence of surra may be due to the fact that many species of ticks hibernate during the colder months. The suggestion is put forward, therefore, that ticks may act as reservoirs for surra and that an outbreak having been started by ticks is carried on by flies.

It is admitted that the paper is far from complete.

DONATIEN (A.) & PARROT (L.). **Trypanosomiase naturelle du chien au Sahara. Note Préliminaire.** [Naturally Contracted Trypanosomiasis of the Dog in the Sahara. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 549–551.

After referring to the discovery of canine trypanosomiasis in the Sahara by VIALATTE, DELANOË and VELU, the author describes a case encountered at Touggourt.

The case ran a course of about three months from the time that symptoms were first observed. The general symptoms were those of trypanosomiasis, with opacity of the cornea of both eyes.

Trypanosomes were present in large numbers in the blood at the time of death.

The parasite is described as long and slender. Detailed measurements are given.

Inoculation of mice produced a fatal result in 11 days, parasites making their appearance in the blood two days after inoculation and increasing without intermission up to the time of death.

Rabbits and guinea-pigs have been infected. The results of cross-immunity tests will be published later.

The author believes it to be a natural case of "el debab" in the dog.

HOARE (C. A.). **Trypanosomiasis in British Sheep. Preliminary Note.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June. Vol. 16. No. 3. pp. 188–194. With 1 text fig.

The author refers to the work done by WOODCOCK, BEHN, FLU, SWINGLE, PORTER, NÖLLER and KLEINE, in connexion with the occurrence of trypanosomes in domestic sheep and Crithidia in sheep keds, and the possible relationships between the two.

Interest in the matter was revived by NÖLLER's cultivation of trypanosomes from the blood of German sheep and his identification of the parasite with the so-called *Crithidia melophagia*, and also by KLEINE's (1919) proof that laboratory-bred keds contained no flagellates, that keds fed upon sheep harbouring trypanosomes acquired them, and that keds could not transmit flagellates to each other either through the faeces or the ova. His supposition was that sheep were infected through the bites of keds, as he found slight infections of the proboscis with trypanosome forms in about 4 per cent. of the keds examined. In 1921 the author succeeded in cultivating trypanosomes from the blood of 80 per cent. of a flock of 50 in Hertfordshire.

In the spring of 1922 he succeeded in obtaining three lambs which could not have had a ked upon them at any time. Their blood was cultured once a week for a month. As a control of the medium cultures were made from sheep having keds, and these always showed trypanosomes.

Two lambs were used for experiment and the other for control.

The first lamb had between 200 and 300 keds placed upon it, and though the blood was examined daily no trypanosomes were found. A culture was made a week after the experiment began and trypanosomes were obtained in it after a week at 30° C.

To ascertain the manner of infection, which it was thought probable was by ingestion of keds, the abdomens of 50–60 keds were mashed up in saline solution and given to the other lamb *per os*. Live trypanosomes were found in the blood on the 18th day and positive cultures were obtained.

Keds taken from the first lamb were allowed to bite the third lamb through gauze for an hour on four alternate days. Four batches of about 40 keds were used on each occasion. This lamb failed to become infected, showing that known infected keds do not transmit trypanosomes by biting.

The study of the cycle of development of the trypanosome is not yet complete, but the author has found that the parasite which occurs in crithidial form in the mid-gut becomes a small trypanosome in the hind-gut. The cycle is comparable apparently to that of *T. lewisi* in the flea.

The trypanosome as it occurs in the sheep is referable to the Theileri group in that it is large (47μ), the posterior end is pointed, the free flagellum is short, the nucleus is near the middle of the body, and the kineto-nucleus is close to it.

Pure cultures have been obtained from the ked and the sheep and have been maintained for nearly a year. They are identical morphologically. They will not grow at temperatures below 30° C., and fail

to develop in N.N.N. medium. The older the cultures are the greater the proportion of trypanosome forms present.

The sheep trypanosome and the Crithidia of the ked should be named *Trypanosoma melophagium.*

Attempts to infect sheep and laboratory animals by inoculation with cultures of the sheep trypanosome failed. The trypanosome does not appear to be pathogenic for sheep, but it is suggested that it may play some part in the condition resulting in sheep and more particularly in lambs when they are heavily infested with keds, and that in some other conditions the balance between the powers of resistance and the trypanosome may be disturbed, thus permitting the latter to gain the upper hand.

PFEILER (W.). **Prophylaxe bei Beschälseuche.** [Prophylaxis against Dourine.]—*Mitteil. d. Tierseuchenstelle der Thüringischen Landesanstalt f. Viehversicherung.* 1922. Jan. Vol. 2. No. 2. pp. 13–15.

It has been found possible to protect small animals against trypanosome infection for periods up to 200 days by means of " Bayer 205." Opportunity has not presented itself of trying the drug in practice upon horses owing to the stringent application of the veterinary police regulations. Some experiments have, however, been carried out on large animals at the Institute.

Two grams of " Bayer 205 " were injected intravenously into a stallion (which was severely affected with mange), and two days later the blood of a mouse, which was heavily infected with trypanosomes, was injected intravenously. Trypanosomes were not discoverable in the blood subsequently, but wasting and swelling of the testicles were observed, and antibodies were discoverable in the serum. It appeared, therefore, that no protection had been conferred by the drug.

In the second experiment a year-old donkey stallion had injected into its urethra and rubbed into its glans penis a suspension of guinea-pig blood which was rich in trypanosomes after it had received an " infusion " of " Bayer 205." Infection failed to occur.

Two and a half months later 4 g. of " Bayer 205 " were given, followed by an intravenous injection of guinea-pig blood containing trypanosomes. At the time of writing, three weeks later, no evidence of infection could be detected. Further observations on this animal are promised.

It is advised that a single dose of 6 g. of " Bayer 205 " be given as a protection during the covering season. In order to prevent the occurrence of pododermatitis 3 g. should be given first, and if no symptoms appear a second dose of 3 g. eight days later. Three grams may also be given from four to six weeks after the first 6 g.

PFEILER (W.). **Kasuistische Mitteilungen über ein auscheinendes Versagen der Bayer 205.—Behandlung bei an natürlicher Beschälseuche leidenden Pferde.** [Regarding the Apparent Failure of " Bayer 205 " in some Cases of Horses naturally infected with Dourine.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1922. Mar. Vol. 88. No. 1. pp. 48–53.

This paper contains a detailed review of a number of cases of dourine treated with " Bayer 205 " in which cures were not effected.

REYNOLDS (F. H. K.) & SCHOENING (H. W.). **The Precipitation of Colloidal Gold in the Cerebrospinal Fluid of Horses with Dourine.**—*Jl. Infect. Dis.* 1922. July. Vol. 31. No. 1. pp. 59–63.

The success following the application of the colloidal gold test devised by LANGE for the classification of affections of the central nervous system led the authors to try it in dourine, which in certain stages is characterized by degeneration of the peripheral nerves and of the intervertebral ganglia.

Thirty-three samples of cerebrospinal fluid taken after slaughter were examined. Complement fixation tests and globulin tests were carried out and the sediment of the fluid was examined for trypanosomes. None were found in any of the samples.

The results of the tests are set out in tabular form and the animals are grouped according to these. The colloidal gold test was found to give reactions in many instances, some of which were similar to those of cerebrospinal syphilis. The cords were not available for microscopic examination, but in view of the positive complement fixation tests it appears to be probable that the reactions had some significance.

BESSEMANS (A.). **Valeur comparative des Techniques de préparation de l'antigène destiné à la réaction de Bordet-Gengou pour la diagnostic de la dourine.** [The Comparative Value of the Different Methods of Preparing Antigen for the Bordet-Gengou Test in the Diagnosis of Dourine.]—*Compt. Rend. Soc. Biol.* 1922. Feb. 4. Vol. 86. No. 5. pp. 289–292.

The author describes briefly methods of preparing antigen from extracts of organs of animals clean of trypanosomiasis and extracts of blood of heavily infected animals, and discusses the value of each.

He comes to the conclusion that aqueous or alcoholic extracts of organs are too feeble antigenically and too irregular in strength to be of any value for the routine diagnosis of dourine by the Bordet-Gengou test. The only two extracts of virulent blood which are reliable are those of Levaditi-Watson and Mohler-Reynolds. The former is one of partial centrifugation and the latter of haemolysis, and of the two the latter is preferable because it furnishes a far larger number of useful doses.

VAN SACEGHEM (R.). **Sérotherapie des Trypanosomiases Animales.** [The Serum-Therapy of Animal Trypanosomiases.]—*Compt. Rend. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 515–516.

The author thinks that in subacute or chronic cases of trypanosomiasis antibodies are developed and that the serum of such animals has protective properties. These powers are, however, of little value against the infecting trypanosomes because they "vaccinate themselves" against the antibodies as they are produced. It has been observed in many cases that trypanosomes disappear from the blood and may remain absent up to the death of the animal, but that some of them escape destruction in the blood and, being unable to maintain their existence there, pass into the cerebrospinal fluid, where they appear to be protected by specific antibodies.

VAN SACEGHEM (R.). **La Sérothérapie dans le traitement des Trypanosomiases.** [Serum-Therapy in the Treatment of Trypanosomiases.] —*Compt. Rend. Soc. Biol.* 1922. May 6. Vol. 86. No. 16. pp. 981–984.

The author has been able to follow the course of several cases of trypanosomiasis in sheep produced experimentally by *T. ruandae*. Sheep possess a slight susceptibility to this infection only, and it takes a very chronic course and terminates in recovery. The author thinks that this recovery appears to be due to the existence of some "obstructive" (empêchante) power which prevents the trypanosomes from multiplying and from invading the central nervous system. He has been able to transmit this power to goats, which ordinarily are very susceptible to infection with *T. ruandae*.

In a previous publication the author has shown that trypanosomes stimulate the production of antibodies in the body, but immunize themselves against these as they are produced. When an animal recently infected with trypanosomes is frequently injected subcutaneously with large doses of serum obtained from an animal which has been infected for several weeks, it acquires this obstructive power. As a result a chronic type of the disease is produced, which terminates in recovery. Attempts to reinfect such animals have failed, but the duration of the immunity has not been determined.

By direct transmission of 500–1,000 cc. of blood from a goat which had been infected, and which had been cured by serum injections into an infected goat, trypanosomes were cleared from the circulation within 24 hours. It was not possible to ascertain whether the disappearance was permanent, as the goat died accidentally. [From this statement it would appear that the experiment was tried in one instance only, yet the dose of blood transfused is very indefinitely given.]

LANDBERGEN (K.). **Trypanosomen en lage temperaturen.** [The Effects of Low Temperatures upon Trypanosomes.]—*Tijdsch. v. Vergelijkende Geneesk. enz.* 1922. Aug. 5. Vol. 7. No. 4. pp. 236–240. [French and English Summaries, pp. 240–243.]

T. lewisi maintains its motility in an ice-box for 50 days, but is infective up to 43 days only.

At −20° C. feeble movements were visible after 80 minutes, but the parasites were non-infective.

A similar result followed an exposure of one hour to a temperature of −30° C.

In liquid air (about −190° C.) both motility and infectivity were maintained for one hour, but both were lost after two hours.

T. evansi, at 4–8° C., motile up to five days, not infective after four days.

At −20° C., still motile after 2½ hours. Infectivity doubtful, as the strain was avirulent.

At −190° C., motile up to 19 minutes. Produced no evident illness in mice (avirulent strain, as above), but conferred immunity against a virulent strain).

T. equiperdum. In ice-chest, infective up to two days, motile up to five.

At −20° C., non-motile and non-infective in about three hours or less.

At −40° C., non-motile after 1½ hours, but still infective at 2¼ hours.

At −145° C., non-motile after 45 minutes, but still infective.

At −190° C., still motile and infective after 31 days.

T. venezuelense.—At 4–8° C., infective and motile up to 3–4 days.

At −20° C., infective after three hours, but not certainly motile after $2\frac{1}{4}$.

At −190° C., motile after 30 days and infective up to 60.

T. brucei. 4–8° C., motile and infective up to three days.

Similar result at −20° C.

At −190° C., motile and infective after 11 days.

BRUMPT (E.) & LAVIER (G.). **Mode d'action du "Bayer 205" sur divers hématozoaires: Trypanosomes, Piroplasmes, Theileries, Anaplasmes.** [The Action of "Bayer 205" on Trypanosomes, Piroplasms, Theileriae and Anaplasms.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 613–621.

The authors summarize the literature which has already appeared regarding the use of this drug and give an account at some length of their own investigations.

Although the composition of the drug has not been published, it is stated by the makers to contain neither mercury nor arsenic, and is described as a fine white powder slowly but completely soluble in cold water to form a 10 per cent. solution. The solution is odourless, slightly bitter and neutral. It keeps if protected from light, and can be sterilized without undergoing any alteration. The particular sample received by the authors did not agree with this description in that the powder was pale pink in colour and both it and the solution possessed a distinct acetone-like smell.

The trypanosome experiments were carried out with *T. brucei*, *T. rhodesiense* and *T. venezuelense*. Experiments with *T. evansi* and *T. cruzi* have been postponed, as strains sufficiently virulent for experiments were not available.

With *T. rhodesiense* and *T. venezuelense* the authors have not found any change in morphology or activity after $1\frac{1}{2}$ hours' exposure to the drug.

In mice which were heavily infected and within a few hours of death, 0·5 mg., either by subcutaneous or intraperitoneal injection, has always sufficed to effect a complete cure. When the dose was reduced to 0·1 mg. trypanosomes disappeared, but were again present 14 days later and death occurred in three weeks. With 0·05 mg. there was a temporary reduction in the number of trypanosomes only.

By intraperitoneal injection the drug effects the disappearance of trypanosomes in about one-sixth the time required by subcutaneous injection (5 hours to 30 hours).

The trypanosomes do not appear to present any marked changes while under the action of the drug. In stained smears stumpy forms are frequently seen, but these are possibly produced artificially in spreading films owing to the increased fragility of the parasites. The trypanosomes are, however, avirulent. A fresh mouse inoculated intraperitoneally with blood from a *brucei*-infected mouse which had been treated 22 hours previously failed to become infected, although trypanosomes were still numerous in the material used.

Smears of blood made just as the trypanosomes are disappearing may show them ingested by large mononuclear leucocytes, but such specimens are rare, and the bulk of the phagocytosis must take place in the internal organs.

Rabbits infected with *T. rhodesiense* and *T. brucei*, showing swelling of the face, conjunctivitis, eczema, and ulceration of the skin, treated intravenously with 0·2 mg., recovered within a week.

The protective properties of the drug were also tested. Doses of 1 mg. [defective type in the original makes it difficult to be certain of this figure.] protected mice against *T. venezuelense* and *T. brucei* when they were inoculated on the 18th and 16th days, but a dose of 1 cg. failed to protect a mouse inoculated with *T. brucei* on the 26th day, although the course of the disease was longer than normal.

Reinfections.—A mouse inoculated with *T. venezuelense* received 1 mg. of "205" on the fourth day. A month later it was reinoculated with the same strain. Trypanosomes appeared two days later and death occurred on the sixth day.

A second mouse treated in exactly the same way became reinfected, but the trypanosomes disappeared from the blood in six days. They reappeared, however, and the mouse died 19 days after their disappearance. The author thinks that the prolonged course of the infection in this case was due to a partial immunity established during the first infection.

Piroplasmosis Experiments.—A cow, inoculated with a mixture of viruses comprising *P. bigeminum, P. argentinum, Theileria mutans, Anaplasma marginale,* and possibly also *A. centrale,* showed Theileria in its blood on the 23rd day. It was given 4 g. of "205" intravenously in 10 per cent. solution. Theileria was still visible in the blood three months later.

A similar result was obtained with a calf treated in exactly the same manner.

A dog infected with a French strain of *P. canis* was given 0·5 g. of "205" subcutaneously. Considerable oedema was developed at the seat of injection. Parasites were more numerously present in the blood. A second dose of the same size was given intraperitoneally. Death occurred from piroplasmosis a few hours later.

The drug was tried in two cases of anaplasmosis of Tunisian origin. The drug had no effect upon the course of the infection, but it is noteworthy that a four-months-old calf tolerated a dose of 4 g. in 10 per cent. solution intravenously.

MASON (F. E.). **Egyptian Fever in Cattle and Buffaloes.**—*Jl. Comp. Path & Therap.* 1922. Mar. Vol. 35. No. 1. pp. 33–39.

This paper contains further observations regarding the occurrence of this disease and goes to refute the statement that has been made to the effect that East Coast fever occurs in Egypt. The author has detected this disease in Sudanese cattle arriving in quarantine, but not in Egyptian animals. BRUMPT has stated that East Coast fever exists in Egypt and that its transmitting ticks are *Rhipicephalus simus* and *Rhipicephalus bursa*. The author has collected ticks systematically for years and has had them identified by NUTTALL and GOUGH. These two species have not been detected.

Egyptian fever occurs in chronic, subacute and acute forms.

In the chronic form there may be no symptoms save a rise of temperature and slight enlargement of superficial glands. Blood examinations reveal the presence of the parasite. Such animals, kept under observation for long periods, have been observed to have recrudescences of fever from time to time associated with the presence of the parasite in the blood. Under adverse conditions it may assume

the subacute or acute form. This sharply distinguishes the condition from East Coast fever.

It has been proved by observations made by the author that calves may become infected between the ages of two and six months. The disease is widely spread in the delta, and it is probable that a high percentage of animals become infected early.

The ticks usually found in association with the disease are *Margaropus annulatus*, *Hyalomma aegyptium* and *Boophilus australis*.

Trypanblue and arrhenal appear to have no effect upon the disease.

Haemoglobinuria does not occur and a subacute attack lasts from four days to a week. Sometimes a period of fever is interrupted by a day or two of normal temperature.

At the post-mortem examination small crater-like and linear ulcerations are found in the abomasum. There may be some enteritis. The spleen is normal in size, but shows ecchymoses, as do the liver and kidneys. The lymphatic glands are enlarged and show haemorrhagic spots.

Examination of the blood shows intracorpuscular rings not exceeding 1μ in diameter, which have a speck of chromatin in the periphery. Only one or two are found per field and not more than one in a single corpuscle. Minute oval and rod-shaped forms also occur.

In the haemorrhagic spots in the spleen and other organs, and in the ulcers in the abomasum, plasmospheres indistinguishable from Koch's bodies may be found.

The acute form is rarely met with. It may develop from the other forms or be acute from the onset. In these cases two or three days after the initial rise of temperature there is lachrymation with petechiae and discoloration (icteric) of the conjunctiva, and salivation. The superficial glands are markedly enlarged. Constipation is followed by diarrhoea, which is blood-stained. The urine may remain normal, but haemoglobin may be detected in it. Blood examination is often necessary to distinguish the condition from Texas fever.

On post-mortem examination the ulcers in the abomasum are never as numerous as in East Coast fever. The caecum and colon show patches of diffuse ulceration. The spleen is enlarged and shows minute haemorrhagic infarcts. These are also seen in the liver. The kidneys show pin-point haemorrhagic infarcts, which are quite different from the large white infarcts seen in East Coast fever. The blood invasion is very heavy. Eighty to ninety per cent. of the corpuscles are invaded by four or five parasites. Rod forms greatly predominate. Plasmospheres are present in the glands and infarcts. Evidences of anaemia have not been observed in the blood.

The disease is therefore due to a Theileria and not a piroplasm, and there is evidence to support the view that it is non-inoculable. Up to the present, crucial inoculation experiments with known "clean" animals have not been carried out, but the evidence derived from large numbers of inoculations with rinderpest blood containing the parasite lends some support to that view.

The disease is not limited to Egypt, as the author has observed it in freshly imported Cyprus cattle, in Sudanese cattle, and in cattle in Palestine.

It appears to be probable that the disease is in reality identical with so-called Transcaucasian fever, and that as a similar disease has been detected in nearly all countries round the Mediterranean some more

suitable name than Egyptian or Transcaucasian fever should be found for it. The author records the occurrence of the parasite and of the disease in buffaloes.

Piroplasmosis in Buffaloes.—Buffaloes have been observed to show the clinical symptoms of piroplasmosis, including haemoglobinuria, and their blood has been found to show the changes usually associated with blood destruction, but as yet the parasite has not been found.

It has been noted that buffaloes enjoy a remarkable freedom from ticks as compared with cattle.

LAVIER (G.) & FOURBEURE (G.). **Complications oculaires dans la Piroplasmose canine experimentale.** [Lesions of the Eyes in Experimental Canine Piroplasmosis.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 545–548.

The authors comment upon the absence of any reference to lesions of the eye in the publications of NOCARD and MOTAIS and NUTTALL and GRAHAM-SMITH, and refer to the work of CLARK and BRUMPT showing that in bovine and canine piroplasmosis respectively multiplication of the parasites takes place in the capillaries of the brain. Noting this special predilection for nerve tissues the authors examined sections of the entire eye from a dog dead of acute piroplasmosis, the blood of which contained only a small number of the parasites. The capillaries of the retina and the ciliary processes were found to be packed with piroplasms. The vessels of the choroid, on the other hand, contained only a few.

The authors describe two cases of chronic piroplasmosis in which lesions were observed which involved the eyes.

In one case the aqueous humour of one eye became turbid about two months after inoculation (parasites having appeared in the blood on the fourth day after inoculation); while the conjunctiva remained normal. Only the left eye was involved. A fortnight later the dog was killed, and though the cornea was saturated and thickened with clear exudate and there was a mass of fibrinous lymph in the anterior chamber, no invaded corpuscles were found in the capillaries.

In the second case interstitial keratitis developed a month after inoculation in one eye. Subsequently slight conjunctivitis was observed in the other eye, but the dog recovered and the ocular lesions cleared up completely.

The authors draw attention to the resemblance presented by these lesions to those observed in trypanosomiasis, leishmaniasis and toxoplasmosis.

BRUMPT (E.) & LARROUSSE (F.). **Transmission de la Piroplasmose canine française par le** *Dermacentor venustus.* [The Transmission of Canine Piroplasmosis in France by *Dermacentor venustus.*]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 540–545.

In view of the very wide distribution of canine piroplasmosis, and of its transmission in natural conditions by means of at least three different species of ticks, the authors have carried out experiments to furnish information as to whether *Dermacentor venustus* is capable of acting as transmitting agent.

The ticks used were obtained from Bitter Root Valley. It is known that dogs act as host to this tick in certain parts of the United States and Canada. By feeding the ticks upon guinea-pigs and hedgehogs a new generation of adult ticks was obtained. Had some young dogs

been available a control experiment to prove that the ticks were "clean" would have been carried out first. It was thought, however, that this control could be omitted, as canine piroplasmosis is not known to occur in the United States (with the possible exception of Florida), and in any case they would have been cleaned during their periods of engorgement upon insusceptible animals.

The first experiment had for its object the infection of *Dermacentor reticulatus* with *Piroplasma canis*.

A young dog was placed in a sack with a number of the ticks in March, 1922, but as the tick is a summer tick in the adult phase only a few attached themselves. Five days later the dog was infected by intraperitoneal inoculation. Parasites made their appearance four days later. Within the next few days four engorged females dropped off. From these a new generation was raised by July, and with these infection experiments were carried out.

About 60 of them were placed on a dog, but only two females were observed to attach themselves. One of these was fertilized and dropped off engorged (13 days) and the other dropped two days later but was not fertilized.

Examination of the dog's blood on the 13th day (when the temperature rose suddenly) showed that ring-shaped parasites were present in small numbers. Death took place three days later. On the day prior to death piroplasms were abundantly present, and corpuscles containing as many as eight individuals were found.

Another dog was inoculated intraperitoneally from the above on the day parasites appeared in the blood. Two days later parasites were present in its blood. The following day 0·5 cg. of "Bayer 205" was injected subcutaneously. The next day the dog was worse and the treatment with "Bayer 205" was repeated, this time intraperitoneally. Death took place shortly afterwards. Parasites were present in 4–5 corpuscles per field.

The lesions of anaemia, though present, were not so marked as in the case of the dog infected by the ticks.

Conseil (E.) & Gérard (F.). **Essais de traitement du Paludisme par le "Trepol."** [The Treatment of Malaria with Trepol.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 534–537.

The authors have tested Trepol (potassium tartaro-bismuthate) in about a dozen cases of malaria, but have found it to be inferior to quinine.

Leger (M.). **Plasmodium d'un Singe de la Guinée Française,** *Cercopithecus campbelli*, **Wath.** [Plasmodium of a Monkey, *Cercopithecus campbelli*, in French Guinea.]—*Compt. Rend. Soc. Biol.* 1922. Apr. 29. Vol. 86. No. 15. pp. 837–840. With 1 text fig.

Gametes and schizonts of a plasmodium were found in the blood of a recently killed monkey of the above species. The sexual forms predominated, and of these the female elements outnumbered the male by four to one. The majority were free in the plasma.

The parasite appears to differ from *Pl. kochi* in the following points. The young parasite is elongated and has solid-looking cytoplasm. The schizont is not amoeboid and is pigmented. The macrogamete causes enlargement of the invaded corpuscle before it escapes, the pigment granules are coarse and packed together. The nucleus is compact and stains deeply. The name *Plasmodium bouilliezi* is suggested.

ROUBAUD (E.) & FRANCHINI (G.). **Infection Naturelle de la Souris par les Flagellés de la Puce,** *Ctenopsylla musculi* **Dug.** [Natural Infection of the Mouse by Flagellates of the Flea, *Ctenopsylla musculi* Dug.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 405–406.

In five instances mice placed in receptacles for the breeding of mouse fleas became infected with the parasite and died, and in one instance a sub-inoculation to another mouse caused infection. Enlargement of the spleen and ascites were the principal lesions. Parasites were discovered usually in the spleen, liver, lungs and bone marrow, and occasionally in the blood.

The organisms were leishmaniform structures. The blepharoplast was rarely visible. In no case were flagellate forms found.

ROUBAUD (E.) & FRANCHINI (G.). **Infection leishmaniforme produite chez la Souris par l'inoculation des fèces de la Puce,** *Ctenopsylla musculi.* [Leishmaniform Infection produced in the Mouse by Inoculation with the Faeces of the Flea, *Ctenopsylla musculi.*]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. p. 407.

The dried faeces of fleas, which are alleged to contain resistant forms of the flea parasite were used with success to inoculate a mouse. Leishmaniform parasites were scantily present in the blood from the 15th day, and when the mouse was killed after two months parasites were present in the spleen, liver, lungs, kidneys, bone marrow and blood. No flagellate forms were found.

A culture in N.N.N. medium failed to show any flagellate forms.

FRANCHINI (G.). **Particularités de culture de certains flagellés. De la culture des Leishmania dans le Milieu de Yoshida.** [Details regarding Cultures of Certain Flagellates. The Cultivation of Leishmania in Yoshida's Medium.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 551–555. With 2 text figs.

In cultures of *Pyrrhocoris apterus* the author has observed what appears to be amoeboid movement of the organisms. The observations were made on blood-broth cultures several months old. The same parasite on N.N.N. medium gave no evidence of this.

In certain conditions it was found that *H. pyrrhocoridis* could resist desiccation. It was found that a few drops of culture which had been left in the bottom of a tube and which had become quite dry gave positive results on resowing.

In very old cultures forms having the appearance of cysts have been found.

The author has been able to cultivate the Leishmania of kala azar in Yoshida's medium, and in general the morphology of the parasites resembles those cultivated on N.N.N. medium, but very large rounded parasites with a number of nuclei and centrosomes, such as are not found in N.N.N. cultures, have been encountered.

CAUCHEMEZ (L.). **Présence d'amibes non iodophiles chez les Porcs français.** [The Presence of Non-iodophile Amoebae in French Pigs.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 390–393. With 1 text fig.

During the year 1921 the author examined at least 300 samples of faeces of pigs, and, in addition to the iodophile amoeba already recorded,

encountered non-iodophile parasites on three occasions. In preparations fixed in Bouin's liquid and stained with haematoxylin the parasites present, as a rule, a rounded appearance and measure from 5 to 12 μ in diameter. The protoplasm is vacuolated and the ectoplasm slightly granular. The nucleus is very pale, measures 2–2·5 μ, and shows a small karyosome in its centre. Binuclear forms, which probably represent the first stage of division, have been encountered. Similar parasites have been described by SMITH, PROWAZEK, HARTMANN and NÖLLER.

A search was made in various parts of the intestine of an infected pig with a view to determining the distribution of the parasites. They were found in the posterior part of the colon and rectum only.

Sections of the rectum failed to show any lesions or penetration of the parasites.

RODHAIN (J.). **L'Ubiquisime parasitaire de l'*Ornithodorus moubata* peut-il influer sur son infection par le spirochète de Dutton ?** [Does the Capacity of *O. moubata* to engorge on Various Animals influence its Transmission of *S. duttoni* ?]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 564–565.

As the result of a small number of experiments the author comes to the conclusion that at least as far as the chameleon is concerned the transmission is not inhibited, but states that further experiments are necessary.

ANIGSTEIN (L.). **Serological Researches on Protozoa. I. Morphology and Serological Properties of** *Prowazekia* (*Bodo*) *edax*.—*Jl. Trop. Med. & Hyg.* 1922. Aug. 1. Vol. 15. No. 25. pp. 242–246.

CARPANO (M.). **La transmissione placentare della piroplasmosi.** [Transmission of Piroplasms via the Placenta.]—*Ann. d'Igiene.* 1922. Apr. Vol. 32. No. 4. pp. 286–292. With 2 text figs.

CREECH (G. T.). **Sarcosporidiosis of Swine, associated with advanced Degenerative Changes in the Musculature.**—*Jl. Amer. Vet. Med. Assoc.* 1922. July. Vol. 61. No. 4. pp. 383–392. With 4 figs.

CROSS (H. E.). **Spirochaetosis of Fowls.**—*Dept. of Agric., Punjab Vet. Bull.* No. 2 of 1921. pp. 1–5. With 1 plate.

FOURCADE (M.), JALOUSTRE (L.) & LEMAY (P.). **Sur les propriétés spirillicides de l'oxyde hydraté de bismuth.** [The Spirillicidal Properties of the Hydrated Oxide of Bismuth.]—*Compt. Rend. Soc. Biol.* 1922. Apr. 24. Vol. 86 No. 15. pp. 815–817.

HADWEN (S.). **Cyst-forming Protozoa in Reindeer and Caribou, and a Sarcosporidian Parasite of the Seal** (*Phoca richardi*).—*Jl. Amer. Vet. Med. Assoc.* 1922. July. Vol. 61. No. 4. pp. 374–382. With 8 figs.

VAN NEDERVEEN (H. J.). **Over de al- of niet identiteit van het Runder- en het Konijneucoccidium.** [Regarding the identity or otherwise of the Coccidia of Cattle and Rabbits.]—*Tijdschr. v. Vergelijkende Geneesk. enz.* 1922. Aug. 6. Vol. 7. No. 4. pp. 226–233. [French and English Summaries, pp. 233–235.]

NIESCHULZ (Otto). **Beiträge zur Kenntniss der Gattung Eimeria. I. Über das Taubencoccid.** [The Genus Eimeria. I. The Coccidium of the Pigeon.]—*Arch. f. Protest.* 1921. Dec. 21. Vol. 44. No. 1. pp. 71–82. With 4 plates and 3 text figs.

NIESCHULZ (Otto). **Ueber die Benennung des Schweinecoccids.** [The Nomenclature of the Coccidium of the Pig.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. June 30. Vol. 88. No. 5. pp. 379–380.

PARROT (L.) & DONATIEN (A.). **Un nouveau cas sporadique de bouton d'Orient sur le littoral algérien.** [A New Sporadic Case of Oriental Sore on the Algerian Coast.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 410–412.

SINTON (J. A.). **A Simplified Method for the Cultivation of** *Plasmodium falciparum* **in Vitro.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 203–209.

SINTON (J. A.). **Further Remarks on a Clinical Method for the Cultivation of the Subtertian Malaria Parasite in Vitro, with a Note on its Use in Diagnosis.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 210–214.

DISEASES DUE TO METAZOAN PARASITES.

BRUCE (E. A.). **Fatalities in Cattle due to the Tick** *Dermacentor venustus.*—*Jl. Amer. Vet. Med. Assoc.* 1922. Aug. Vol. 61. No. 5. pp. 537–539.

The tick has a wide distribution in south-eastern British Columbia, and in the spring is a frequent cause of paralysis and sometimes of death in man and animals. The condition is very commonly observed among sheep, and somewhat rarely in dogs.

D. venustus is, with the exception of *D. albipictus*, the commonest cattle tick in the area, but up to the present no records of ill effects in cattle have been published.

Before dealing with two cases in cattle the author outlines the state of affairs in a flock of 400 sheep, 300 of which he saw affected, in the spring of 1920.

The first case occurred on the eighth day after the sheep were turned out on the range, and three days later practically the whole 300 (out of 400) were affected. Improvement began to appear in some animals three days later, and after a week the sheep were moved from the hills to meadowland. Within a few days only a few animals showing inco-ordination and one paralysed remained. Ten females were found on this yearling. These were removed and prompt improvement was observed.

Cases in Cattle. Some affected cattle were imported from Alberta the previous autumn, and the symptoms are said to have been similar to those presented by sheep.

The first case was a two-year-old heifer in poor condition, which was found dead, and from the condition of the carcase and of the ground it was judged that death had occurred two days previously, and that the animal had been down and struggling for possibly 24 hours before death occurred. An area of about an inch across was found just behind the base of the horns, which was covered with the excrement of ticks, and there were four other places along the spine which gave evidence that ticks had been attached.

The second case was also a two-year-old heifer. This was still alive when seen, but it appeared to have been down for about 12 hours. On the back of this animal there was an area, three inches in diameter, which was covered with ticks, mainly engorged females (about 100). There was a smaller area behind the base of the horns and other places with ticks attached.

RODHAIN (J.). **La subsistance de l'***Ornithodorus moubata* **sur des reptiles et des sauriens.** [The Subsistence of *Ornithodorus moubata* on Reptiles and Lizards.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 560–564.

The author has previously recorded the fact that *O. moubata*, the transmitting agent of relapsing fever in Central Africa, can maintain itself on animals of variable temperature.

The author has not been able to complete the experiments he had in mind, but certain results have been obtained.

He found that the blood of the lizard, gecko and snake are as suitable for the nymphs as guinea-pig blood, but that the blood of the chameleon is difficult to digest, and toxic. It produces a lethargic condition in the ticks, and large numbers die after a full meal of it.

Nymphs which had three meals on *Causus rhombeatus* were at 5½ months as large as those fed upon guinea-pigs and rats; larvae fed on the snake died in larger numbers than those fed on the mammals.

Subsequent experiments indicated that survival of a meal of chameleon blood enabled the ticks to feed upon them subsequently without ill effect, but the blood was always difficult of digestion. The ticks may become mature, but it is not established whether they can lay viable eggs.

ROUBAUD (E.) & DESCAZEAUX (J.). **Evolution de l'***Habronema muscae* **Carter chez la mouche domestique et de l'***H. microstomum* **Schneider chez le Stomoxe.** [The Development of *Habronema muscae* Carter in the House-Fly and of *H. microstomum* in Stomoxys.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 572–574.

The authors refer to their previous investigations regarding the development of *H. megastomum* in the Malpighian tubes of the larva of the house-fly, and are able to state, as a result of more recent research, that it is in the distal portion of the posterior pair of tubes that this development takes place.

The authors find that the developmental processes of *H. muscae* and *H. microstomum* are identical, and are as follows:—

The embryos ingested by the flies pass through the wall of the alimentary tube and for a short time are free in the body-cavity. They then penetrate the fat body, and remain there until they have reached the third stage of development. In no instance is there any encystment. The encystment described by other observers is apparently the wall of the adipose cell enclosing the parasite.

The escape of the larvae from the proboscis is one of active spontaneous emission depending upon a definite degree of warmth and moisture. Horses become infected either via mucous membranes or wounds.

JOHNSTON (T. H.) & BANCROFT (M. J.). **The Life-History of Habronema in Relation to** *Musca domestica* **and Native Flies in Queensland.**—*Proc. Roy. Soc. Queensland.* Brisbane. 1920. June 1. Vol. 32. No. 5. pp. 61–88. With 7 text figs. (Summarized in *Rev. App. Entomol.* 1922. Jan. Vol. 10. Series B. Pt. 1. p. 15.)

In Australia *H. muscae* and *H. megastoma* are transmitted by *M. domestica, M. humilis, M. lusoria, M. terrae-reginae, M. hilli, Pseudopyrellia, Sarcophaga misera*, and probably other species of Sarcophaga. *Anastellorhina augur* has been infected experimentally with Habronema, but it does not appear to transmit the parasite

normally The larval development of *H. microstoma* occurs in *Stomoxys calcitrans*, and *Lyperosia exigua* is also suggested as a possible host.

PATTON (W. S.). **Note on the Value of a Tame Cow for Collecting Blood-Sucking Diptera of a Locality.**—*Indian Jl. Med. Research.* 1922. July. Vol. 10. No. 1. pp. 66–68.

The author has found a tame cow an extremely valuable assistant in collecting biting insects, but he insists that it must be really quiet and must not object to nets or test-tubes being placed on its skin. He gives a list of 24 Diptera collected upon a tame bull at Coonoor

CROSS (H. E.) & PATEL (P. G.). **Hypoderma Larvae in Goats.**—*Dept. of Agric. Punjab Vet. Bull. No. 3.* 1921. pp. 1–3. With 1 plate.

In the Jhelum District, in October and November, 1920, an examination revealed the existence of infested goats in percentages ranging from 48 to 91 in different herds. The number of parasites found varied between 6 and 30 per animal. It has been calculated that 25 per cent. of goat skins exported from India are depreciated from 50 to 70 per cent. as a result of damage done by the parasites.

Larvae emerge during December and flies emerge from the pupae during February and March.

The larvae have 11 segments, of which the first five have two circlets of minute black bristles. Preserved fully grown larvae measure about 17 mm. by 10 mm. There is a row of irregular protuberances on each segment, those at the sides being the larger, and each carries some yellowish scale-like growth. The ventral surface is set with chitinous ridges, one between two segmentations, and is provided with a row of minute denticles. These ridges are absent from the last three segments.

HIRST (S.). **Mites Injurious to Domestic Animals (with an Appendix on the Acarine Disease of Hive Bees).**—*British Museum (Natural History) Economic Series, No. 13.* pp. 1–107. With 85 text figs. London: Printed by order of the Trustees of the British Museum. 1922. [Price 3*s*.]

The principal value of this publication lies in the clear illustrations of the various parasites dealt with.

GIGLIOLI (G.). *Armillifer brumpti* **n. sp., nouvelle espèce de Linguatulidé de Madagascar.** [*Armillifer brumpti* n. sp., a New Species of Linguatula from Madagascar.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 565–572. With 2 text figs.

The author gives a detailed description and classification of a linguatula found in a snake (species and genus not known) in Madagascar.

TUBANGUI (M. A.). **Two New Intestinal Trematodes from the Dog in China.**—*Proc. U.S. National Museum.* 1922. Vol. 60. Art. 20. pp. 1–2. With 4 plates.

The author describes two worms in the United States National Museum which have not hitherto been dealt with. They are a species of Prohemistomum and a variety of *Echinochasmus perfoliatus*, which differs from the European specimens.

MAPLESTONE (P. A.). *Cryptocotyle lingua* (**Creplin, 1825**), **Fischoeder, 1903, in a Dog in England.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 153–156. With 1 text fig.

Three specimens of this fluke were found in a dog killed in Liverpool.

The worm has previously been recorded from many fish-eating birds in Europe and North America, and once in a dog (WIGDOR, 1918).

From his examination of the specimens found, the author is inclined to think that RANSOM's definition of the genus (1920) is too detailed for generic distinction.

CAWSTON (F. G.). **Bilharzia in Cattle. A Question of Identity; Promising Curative Measures.**—*The Farmer's Weekly.* Bloemfontein. 1922. Apr. 26. Vol. 23. No. 581. p. 620.

Bilharzia has not up to the present been recorded as a naturally occurring parasite of cattle, but the author has found ova resembling those of cattle bilharzia in the urine of three boys who had frequently entered water used by cattle. The identity of the parasites can only be determined with certainty from an examination of adult worms, and efforts are being made to obtain these from the eggs passed.

The question arises whether the bilharzia parasite of man, which is so common in some parts of Natal, may not sometimes infest cattle, and the suggestion is put forward that some chronic cases of redwater, in which the animals remain in fairly good condition, may be due to such an infestation.

The possibility of good results following the administration of freshly prepared solutions of tartar emetic is suggested.

CAWSTON (F. G.). **The Experimental Infestation of** *Physopsis africana.* —*Ann. Trop. Med. & Parasit.* 1922. July. Vol. 16. No. 2. pp. 207–211. With 3 text figs.

The interest of this short paper lies in the description of the technique employed.

The author found that glass jars were unsuitable for observing growth for more than a few days, but that wooden tubs kept in the shade out of doors answered very well. There was no need to change the water, and an abundance of food was present in the form of water plants, leaves, etc. Specimens large enough for experimental purposes could only be obtained after about five months.

CURTICE (Cooper). **The Protection of Lambs from Stomach Worms.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Aug. Vol. 61. No. 5. pp. 529–533.

It is recommended that all sheep on the farm should be given copper sulphate solution once every four weeks throughout the year, excluding unweaned lambs and ewes within a fortnight of lambing.

The copper sulphate solution is made up by dissolving one pound of the salt to two quarts of water. This is a stock solution. For use four ounces of this are added to three quarts of water, and this is sufficient for 25 sheep. More accurately, the dose must be varied in accordance with weight; four ounces for an 80-lb. sheep, three ounces for a 60-lb. one, and so on in proportion.

Supplementary control measures are necessary to secure the best results. Frequent changes of pasture (to clean or slightly contaminated ones). Cultivation reduces the soil infestation, and the keeping of land free from cattle or sheep for at least a year is valuable.

The treatment and measures of sanitary control advised have proved valuable not only from the point of view of checking the malady, but in the increased value of the flocks, fleeces, etc., etc.

JOHNSTON (T. H.). **Onchocerciasis of Queensland Cattle.**—*Trans. Proc. Roy. Soc. South Australia.* Adelaide. 1921. Dec. 21. Vol. 45. pp. 231–247. With 28 figs & 1 table. [Summarized in *Rev. App. Entomol.* 1922. July. Vol. 10. Series B. Part 7. p. 133.]

The three species of *Onchocerca*, Neum., recorded are: *O. gutturosa*, *O. lienalis*, Stiles, and *O. gibsoni*, Cleland & Johnston. The above are found in cattle in Queensland, New South Wales and the Northern Territory.

Reference is also made to *O. fasciata*, Railliet & Henry, of camels in Western Australia.

SWIFT (H. F.), BOOTS (R. H.) & MILLER (C. P.). **A Cutaneous Nematode Infection in Monkeys.**—*Jl. Experim. Med.* 1922. May 1. Vol. 35. No. 5. pp. 599–620. With 14 plates.

The authors describe a naturally occurring infection in monkeys caused by a worm parasite. Full details of the distribution and nature of the lesions are given.

Only a few intact specimens of the female worm were obtained. Its classification is discussed and the decision is arrived at that it belongs to the genus *Capillaria* (synonym *Trichosoma*), and the specific name *Trichosoma cutaneum* 1922 is suggested.

A number of monkeys (*Macacus rhesus*) were found to be infested, and the lesions varied in location and type. Subcutaneous nodules, oedema around joints, elongated blisters on the palms and soles were observed.

In the subcutaneous nodules larval and possibly male forms were found. Eosinophiles, giant cells and young blood-vessels were found in these lesions, with, subsequently, encapsulation and, after the death of the worm, disappearance of the nodules. In the skin of the palms and the soles elongated blood blisters were formed by the burrowing female. In these the eggs were laid. With subsequent formation of pus and rupture of the blisters the eggs were liberated.

MAPLESTONE (P. A.) & SOUTHWELL (T.). **Notes on Australian Cestodes. V. Three Cestodes from the Black Swan.**—*Ann. Trop. Med. & Parasit.* 1922. July. Vol. 16. No. 2. pp. 189–198. With 7 text figs.

The parasites described in this paper are:—

1. *Nematoparataenia paradoxa* n.g., n.sp.;
2. *Echinorhynchotaenia nana* n.sp.;
3. *Hymenolepsis lanceolata* (Bloch, 1782), Weinland 1858:

and all were obtained from the black swan (*Chenopsis atrata*).

SOUTHWELL (T.). **Cestodes in the Collection of the Indian Museum.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 127–152.

This paper is divided into six sections. The first is a catalogue of Cestodes found for the most part in mammals dying at the Calcutta Zoological Gardens. The second part deals with the tapeworms of pigeons, the others with those of ducks, crows, miscellaneous birds, reptiles and amphibians.

VAJDA (T.). **A New Method for Detecting the Eggs of Parasites in Faeces.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Aug. Vol. 14. No. 5. pp. 534–536. With 1 text fig.

This method depends upon making a mixture of the faeces with a specific gravity greater than that of the eggs. Glycerin is used for this purpose. Horse or pig faeces should be thoroughly mixed with twice their volume of water; for sheep, goat or dog faeces three times the amount. For soft faeces the amount of water should be reduced, and in cases of diarrhoea no water should be added. As the eggs of different species vary in specific gravity the minimum amount of glycerin necessary for their isolation varies. For Strongylus, Oxyuris, Dochmius and Oesophagostomum an equal amount of glycerin is used. For *Ascaris megalocephala* 1½ volumes are used, and for *A. marginata, A. lumbricoides* and Trichuris 3 parts are used.

The mixture is centrifuged at moderate speed for 15–20 minutes, and the eggs rise to the top of the liquid. For microscopic examination they may be removed by touching the surface of the liquid with a dry glass rod and transferring the eggs adhering to it to a slide. The rod should not be dipped into the liquid and a pipette should not be used, as by these means fewer eggs are recovered.

Eggs remain unchanged in the top layer of liquid for a long time, and a certain degree of development of the embryos may occur. If examinations of the specimens cannot be made on the spot, a useful method of collecting the material is to tie a piece of filter paper over the top of a wide tube and lower this down until it touches the surface of the liquid. This will carry the eggs away with it, and may be kept after careful drying for subsequent examination.

Fluke eggs cannot be examined in this way, as the glycerin is destructive to them.

CUIREA (I.). **Sur quelques trématodes du renard et du chat sauvage.** [Some Trematodes of the Fox and Wild Cat.]—*C.R. Soc. Biol.* 1922. June 24. Vol. 87. No. 23. pp. 268–269.

CRAWLEY (H.). **A Case of Demodectic Mange in a Bull.**—*Jl. Amer. Vet. Med. Assoc.* 1922. July. Vol. 61. No. 4. pp. 441–443. With 1 fig.

DAUBNEY (R.). **The Lesions in Lungworm Disease ["Husk" or "Hoose"] of Cattle.**—*Jl. Comp. Path. & Therap.* 1922. June 30. Vol. 35. No. 2. pp. 108–117. With 6 text figs.

DELANOË (P.). **Le Mouton piège à puces.** [Sheep as Flea Traps.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 417–418.

DELANOË (P.). **Au sujet d'***Ornithodorus marocanus* **Velu 1919.** [*Ornithodorus marocanus* Velu 1919.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 418–420.

GEDOELST (L.). **La trimorphisme larvaire des Oestrides.** [The Trimorphism of the Larvae of Oestridae.]—*Compt. Rend. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 501–504.

HALL (M. C.). **The Eggs and Larvae of Poultry Parasites.**—*Veterinary Medicine.* 1922. Sept. Vol. 17. No. 9. pp. 535–538.

JOHNSTON (T. H.) & TIEGS (O. W.). **On the Biology and Economic Significance of the Chalcid Parasites of Australian Sheep Maggot Flies.**—*Proc. R. Soc. Queensland.* Brisbane. 1921. Aug. 17. Vol. 33. No. 6. pp. 99–128. With 36 figs.

KHALIL (M.). **A Preliminary Note on some new Nematode Parasites from the Elephant.**—*Ann. and Mag. Nat. Hist.* 1922. Feb. Vol. 9. Series 9. pp. 212–216.

LEGER (M.). **Microfilaire sanguicole nouvelle du** *Cercopithecus butukoferi.* [A New Blood Filaria of *Cercopithecus butukoferi.*]—*Compt. Rend. Soc. Biol.* 1922. Apr. 29. Vol. 86. No. 15. pp. 835–837. With 1 fig.

Noc (F.). **Infestation massive naturelle de la Genette du Sénégal par des larves de Porocéphales.** [Heavy Natural Infestation of the Genet (*Genetta pardina*) in Senegal with Porocephalus Larvae.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 621–631. With 3 plates.

Noc (F.) & Giglioli (G. S.). **Linguatulids parasitic in Monitors. The New Genus Sambonia.**—*Jl. Trop. Med. & Hyg.* 1922. Sept. 1. Vol. 25. No. 17. pp. 276–280. With 4 text figs.

Pillers (A. W. N.). *Paramphistomum cervi* **(Zeder) from a Cow in Cheshire.**—*Vet. Jl.* 1922. Aug. Vol. 78. No. 8. pp. 292–293. With 1 text fig.

Shannon (R. C.). **The Bot-flies of Domestic Animals.**—*Cornell Veterinarian.* 1922. July. Vol. 12. No. 3. pp. 240–262. With 11 text figs.

BACTERIAL DISEASES.

Schroeder (E. C.). **The Present Status of Vaccinations against Abortion Disease of Cattle.**—*Jl. Amer. Vet. Med. Assoc.* 1922. July. Vol. 61. No. 4. pp. 363–373.

In his opening paragraphs the author refers to two statements previously made by him regarding the value of live cultures of the abortion bacillus in certain circumstances, and he sees no reason to modify those statements. He also draws attention to the unsatisfactory and often very disappointing results that follow the use of vaccines of doubtful nature. The three points dealt with in the present paper are: (1) the peculiar nature of the problem of immunizing against abortion; (2) the factors which must be taken into consideration before vaccination is approved; (3) the results of tests carried out with samples of suspensions of alleged live abortion bacilli purchased in the open market.

1. The problem is peculiar in that the true habitat of the organism is the foetal membrane, an organ which is intermittently present. When this organ is absent the animals are virtually immune, but not because of the absence of foetal envelopes, since the organism does not seem to have power to attack or flourish in the other organs. It may, however, persist for varying periods in the udder, but it has not been proved to be responsible for disturbances.

It will therefore be seen that the aim of the injections is to establish an immunity for the protection of an organ which is to be developed later. Hence it is important to time the injections carefully. It may be inferred from the frequent occurrence and often long persistence of abortion bacilli in the udders of infected and apparently immune cows that antibodies rarely become excessively abundant. This factor indicates that it is reasonable to think that large or repeated doses are required to establish immunity, and explains the superiority of living over dead or attenuated cultures. The problem is complicated by the fact that animals injected with living virulent vaccine may become persistent and dangerous carriers of infection.

2. Factors requiring consideration.

The strains that may be used safely for vaccine preparation.

In conjunction with Cotton, the author recently had the opportunity of examining three strains of abortion bacilli isolated from swine in Indiana, Illinois and California. The three were alike in all their characters, which were those of Bang's bacillus. In their pathogenicity for guinea-pigs they were not wholly like any of the strains isolated

from infected cattle. The lesions produced were more gross in character, lesions of the bones were more common, and lesions developed in parts of the body in which bovine strains have not been observed to cause lesions. An example of the latter was the development of post-orbital abscesses, causing destruction of the eyeball. One of the strains was proved to be capable of producing abortion in both cattle and swine. This is important, as swine are usually resistant to strains of bovine origin.

The evidence appears to indicate that the type of bacillus which is pathogenic for both swine and cattle is more pathogenic for the guinea-pig than organisms isolated from outbreaks among bovines only.

The question of virulence must therefore be considered in making living suspensions for protective purposes.

Experiments made by the author and COTTON some years ago have been repeated with the same results, namely, that suspensions of abortion bacilli in normal salt solution rapidly lose virulence, so that they may fail to produce lesions in guinea-pigs after 48 hours. The loss of virulence was associated with loss of viability on culture media. These results were obtained with five strains. The reason for this is not as yet known, and sufficient tests have not been carried out to determine whether it is a frequently occurring phenomenon or not. This point is of importance in connexion with the marketing of so-called living vaccines.

The conditions under which bacteria for suspensions are grown also require consideration. Experiments have indicated that bacilli grown in vessels, the air in which is rich in carbonic acid gas, are not as readily or as perfectly agglutinated as those grown in ordinary air. Nothing is known regarding the factor or factors responsible for this. The possibility of the bacillus being influenced by the type of container in which the suspension is dispensed must also be a point for further investigation, as it is conceivable that the colour of the glass used might influence so delicate an organism as the *B. abortus*.

In the meantime, and until fuller information is obtained, the author is inclined to think that in order to immunize cattle successfully it may be necessary to send the living undisturbed cultures to the place where the vaccine is required, so that the suspensions may be made on the spot and used within a few hours.

3. In examining commercially-produced vaccines the following tests were applied to each of 24 samples obtained: (1) microscopic examination of the vaccine itself; (2) cultivation on suitable media; (3) microscopic examination of cultures obtained; and (4) tests with positive and negative sera by agglutination.

The following tables record the results:—

1. *Microscopic Examination of the Suspensions.*

Bacteria indistinguishable from abortion bacilli	15
Slightly contaminated	2
Grossly contaminated	7

2. *Growth on Culture Media.*

Abundant growth indistinguishable from growth of *B. abortus*	14
Very meagre growth, but indistinguishable from *B. abortus*	3
No growth	1
Growth quite unlike that of *B. abortus*	3
Cultures not made on account of obvious contaminations	3

3. *Examination of Growths obtained.*

Bacteria indistinguishable from *B. abortus*	14
Same plus a few large cocci	3
Pure cultures of a large coccus	2
Miscellaneous bacteria	1
No growth	1
Cultures not made	3

4. *Agglutination Tests.*

Completely agglutinated by positive serum and negative to negative	7
Poorly by positive, negative to negative	3
Poorly by positive, more or less sensitive to negative	8
Suspensions containing so-called antiserum could not be tested	6

The condemnation of suspensions by one or other or more of these tests left at the end only five out of 24 which responded correctly to all of them. The samples were obtained from five different concerns, but to dispel any impression that a particular producer's article is invariably excellent the results obtained with six samples obtained from the producer with the best record are tabulated as follows :—

Satisfactory to all four tests	2
Satisfactory to 3 tests, but only a few bacteria viable as shown by cultivation	2
Satisfactory to 3 tests, but practically dead	1
Satisfactory to 2 tests, but dead by cultural test	1

As the suspensions were dated to be used before a date two months after the tests were carried out, there was a possibility that at that date even less satisfactory results would be obtained.

The author's conclusion is that vaccination is in the experimental stage.

FITCH (C. P.). **The Cultivation of the** *Bacterium abortus* **Bang.**—*Jl. Infect. Dis.* 1922. Sept. Vol. 31. No. 3. pp. 233–236. With 1 text fig.

The author has tried the various special methods which have been devised for the cultivation of this organism, and finds that the best results are obtained on slants of beef infusion agar with 10 per cent. of horse serum adjusted to P_H 6·8 to 7·2 incubated in an atmosphere with about 10 per cent. carbon dioxide.

He has found however that, contrary to the view expressed by HUDDLESON, the carbon dioxide has no special action in favouring the growth of the bacillus. Exactly parallel results were obtained when hydrogen was substituted for the carbon dioxide.

MEYER (K. F.), SHAW (E. B.) & FLEISCHNER (E. C.). **The Pathogenicity of** *B. melitensis* **and** *B. abortus* **for Guinea-pigs.**—*Jl. Infect. Dis.* 1922. Aug. Vol. 31. No. 2. pp. 159–197.

In this paper the authors detail further tests which have been carried out with *B. melitensis* and *B. abortus*. As the paper is full of details of technique and of laboratory experiments it does not lend itself to

abstraction; the authors' discussion and conclusions may, however, be summarized as follows :—

The authors refer to results already published in which the test animals used were monkeys. In the present series guinea-pigs have been used. It would appear that while for the monkey *B. melitensis* is the more virulent, the reverse is the case in the guinea-pig. Experiments designed to provide an answer to the question whether either organism can be transformed into the other have not yielded positive results.

It is sometimes difficult to distinguish the diseased conditions produced in guinea-pigs by the two organisms save by cross-absorption tests. Four strains of *B. melitensis* from various sources infected guinea-pigs regularly, while 18 proved non- or feebly pathogenic. The lesions were, however, less severe than those caused by *B. abortus*; they had, however, a similar distribution.

MINETT (F. C.). **Immunological Studies with the Preisz-Nocard Bacillus and their Application to Ulcerative Lymphangitis in the Horse.**—*Jl. Comp. Path. & Therap.* 1922. June. Vol. 35. No. 2. pp. 71–107.

It is impossible to do justice to this paper, which abounds in technical details, in a brief abstract, and those interested should consult the original; the following is an abstract of the author's "General Discussion and Conclusions."

The injection of the Preisz-Nocard bacillus into experimental animals produces antitoxin, agglutinins, precipitins, complement-fixing bodies and, less definitely, opsonins.

It has been possible to separate two strains which were different antigenically from the others (eight in number). One of these was from an unusual situation, and the other produced a toxin of a different type from that of the main group. The opportunity was taken of showing that it differed from the toxin of *B. diphtheriae*. The existence of strains of B. Preisz-Nocard showing such differences is on all fours with what is known regarding the toxins of strains of *B. diphtheriae*. The value of the complement-fixing power has not been definitely established, but indications of its value have been obtained. It is important that strains which are powerfully antigenic should be used.

Evidence has been produced in the experiments recorded in this paper and elsewhere to show that the Preisz-Nocard bacillus and *B. diphtheriae* belong to the same group, that they produce similar toxins, and tend to remain latent in the tissues once they are introduced. Carriers of both infections are known to exist. Both organisms possess remarkable powers of vitality under certain conditions. By using heat-killed or alcohol-ether-killed bacilli one can prepare a serum which is both antibacterial and antitoxic. The best technique for the production of antisera has to be worked out. In cases of ulcerative lymphangitis careful local application of an antibacterial serum should be tried. Vaccines have been found to be capable of stimulating the production of antibacterial and antitoxic substances in experimental animals (horses and rabbits), and the concentration of such bodies has been found to be greater after intravenous injection than after subcutaneous. To obtain the best results in treatment the vaccine should be given as early as possible, and in the earlier stages should be accompanied by serum injections. The usual surgical treatments should be carried out.

ABT (G.) & LOISEAU (G.). **Réaction du milieu et production de la toxine diphtérique.** [The Reaction of the Medium and the Production of Diphtheria Toxin.]—*Ann. Inst. Pasteur.* 1922. July. Vol. 36. No. 7. pp. 535–561.

The author finds that Martin's broth with a reaction of P_H 7·5 to 7·9 gives very regular results. The toxin produced in such a medium kills guinea-pigs of 350 gm. in four days at a dose of $\frac{1}{700}$ cc. Similarly, powerful toxin may be obtained in a medium of P_H 6·8, and the cultures are toxic from the seventh to the eleventh day. Above P_H 8·6 no toxin appears to be formed, and below P_H 6·8 the toxicity rapidly declines. Of a toxin developed in a medium of P_H 5·8 to 6·1 about 0·1 cc. is required to kill a guinea-pig.

The explanation is not yet forthcoming as to why, when a medium which is too acid at first subsequently becomes alkaline, no toxin is developed.

The change of reaction in Martin's broth during the first few days of cultivation depends upon whether it is above or below P_H 7·3 to 7·4 to begin with. When it is more acid to begin with it tends to become more alkaline and vice versa.

KNOWLES (R. H.). **Detection of the Spores of the *Bacillus anthracis* in Soil.**—*Jl. Comp. Path. & Therap.* 1922. June. Vol. 35. No. 2. pp. 121–125.

In this paper is described an outbreak of anthrax at Baghdad which, in the course of about a month, resulted in the death of 34 horses and 12 mules.

The symptoms were those ordinarily presented, but it is noted that there was moderate swelling of the throat in four cases only, and that in one animal swelling of the sheath was pronounced. Blood from one of the ear veins was taken for examination in each instance.

When microscopic examination failed to establish a diagnosis other methods were employed. The blood proved positive by the microscope in 74 per cent. of cases, and in the remaining cases diagnosis was established by artificial cultivation.

Samples of hay, barley, lucerne and bersim were tested with a view to establishing the source of the infection, and in all 26 samples were examined. Cultural and biological methods were used. All the culture tests failed, but one plot of ground from which lucerne was obtained was incriminated by the biological test. Feeding with the green food was stopped, and the last case occurred ten days after. When feeding with green foods was again started, that from the particular plot incriminated and those immediately round it was excluded. No other cases occurred. This confirmed the source of the contamination.

As the temperature at the time was 90–95° F. and there was plenty of moisture from irrigation, it is possible that the bacillus of anthrax was maintaining itself as a saprophyte; on the other hand, the crowding out of the bacillus by other organisms, which was observed in culture, rather suggested the possibility that the anthrax bacillus would not be able to compete with the more rapidly growing saprophytes.

The area of land from which the contaminated food was obtained was known to have been used for Turkish horse lines.

MASON (F. E.). **Treatment of Tetanus in the Horse by Magnesium Sulphate.**—*Jl. Comp. Path. & Therap.* 1922. Mar. Vol. 35. No. 1. pp. 39–40.

The author refers to an article describing this treatment which appeared in the same journal in 1911 by DAWSON, who described the treatment as "Dr. Paterson's," but gave no reference.

The necessity for a safe, practicable and inexpensive treatment led him to experiment along the same lines.

His first experiments were carried out in 1912, when seven cases were treated. The animals, Arab horses and Syrian mules, were given daily subcutaneous injections of 50 cc. of a 30 per cent. solution. Other medicinal treatment was given, but no serum. Four out of the seven recovered.

Between the years 1912 and 1920 details of 123 cases of tetanus were collected. They included 44 horses, 46 mules, 21 donkeys, 8 cattle and 4 camels. Sixty-one of these did not receive the magnesium sulphate treatment, and the mortality was 80 per cent. Sixty-two were given the medicament, and the mortality was 32·26 per cent.

Four cases which had the drug also had serum, but two recovered and two died.

In seven cases, five horses and two cattle, serum was used upon animals which had not had magnesium sulphate. Four of the horses died. The cattle, which are less susceptible, recovered.

Daily doses of 50 cc. (average) of 30 per cent. solution are given until the symptoms disappear, which usually takes place in a week. A fresh site should be selected for each injection. Ordinary medicinal treatment is carried out at the same time.

In two cases the sulphate was given intravenously, and the animals recovered. "The average dose would then be estimated at not more than half of the subcutaneous dose diluted to 1 per cent."

NAKAMURA (N.). **Investigation on a Diarrhoea in Young Chicks in Japan.**—*Jl. Japan. Soc. Vet. Sci.* 1922. June. Vol. 1. No. 2. pp. 93–101. With 1 plate. [Author's English abstract.]

The disease under investigation, known as Dabatare, occurs in chicks up to three weeks old. From his experiments the author concludes that the condition is distinct from white diarrhoea observed in other countries. The lesions appear to be more or less inconspicuous save that the kidneys are said to be somewhat atrophied and dotted with greyish white points, and the mesentery studded with numerous gas-containing cavities of different sizes.

The organism isolated was a Gram-positive anaerobe measuring 2–7 μ by 0·8–1·5 μ. It was non-motile and non-sporulating. Acid and gas were produced in dextrose, laevulose, lactose, saccharose, maltose and mannite.

Feeding experiments were carried out with seven strains, and in all cases (41) the disease was produced in from 1 to 6 days, and death occurred in 3–13 days. Subcutaneous and intravenous inoculation failed to set up the disease and feeding experiments failed in birds more than seven weeks old.

The organism was pathogenic for rabbits, guinea-pigs and mice by intraperitoneal inoculation, and for pigeons by intramuscular inoculation. In the mammals, peritonitis and septicaemia were produced, and in pigeons, which died in from 1 to 3 days, there was also generalized infection and, in addition, gelatinous necrosis at the seat of inoculation. The bacillus was isolated from the soil on the premises where the outbreak occurred and from the exterior of egg-shells.

EMOTO (O.). **On the Nature of Lumbar Paralysis in the Goat.**—*Jl. Japan. Soc. Vet. Sci.* 1922. Mar. Vol. 1. No. 1. pp. 1–34. With 2 plates. [Author's abstract.]

A disease characterized by lumbar paralysis has made its appearance among goats imported from Switzerland, and their progeny. Only pure bred animals have been affected. The disease appears usually during the summer and autumn, and its onset is sudden. Cases vary in severity. In severe ones the animals are unable to stand. There are no discoverable lesions in the internal organs, but there is marked sclerosis of the spinal cord and inflammation of the pia mater.

In eleven cases examined bacteriologically a streptococcus was isolated from the spinal fluid, which was never found in healthy animals or in animals suffering from other diseases. Inoculation of 11 goats with cultures of this organism produced the symptoms and lesions found in natural cases.

HARVEY (W. F.) & IYENGAR (K. R. K.). **The Influence of Age and Temperature on Bacterial Vaccines. Part II.**—*Indian Jl. Med. Research.* 1922. July. Vol. 10. No. 1. pp. 192–202.

By means of killed cultures of the bacillus of fowl cholera preserved with phenol the authors have immunized batches of pigeons with accurately graduated doses, and have subsequently tested the birds with fully virulent cultures. The vaccines were kept at two temperatures, namely, room temperature (10–20° C.) and body temperature (37° C.). The latter was used designedly, as that temperature is commonly encountered in the plains of India for long periods at a time. At the same time the agglutinin content of the birds' bloods was tested. They found that vaccines stored at either of the temperatures showed no diminution of potency up to nine months, but deterioration set in after that.

The agglutinin content produced by the vaccine did not fall. They conclude, therefore, that the agglutinating power of the blood cannot be taken as an index of the protection afforded by inoculation.

HARVEY (W. F.) & IYENGAR (K. R. K.). **Retention of Virulence of a Micro-organism kept in Sealed Culture.**—*Indian Jl. Med. Research.* 1922. July. Vol. 10. No. 1. pp. 190–191.

The authors have previously shown that a culture of the fowl cholera organism retained its virulence without animal passage for at least a year when transplanted weekly upon blood agar. On ordinary agar there was great loss of virulence. The same organism was sealed up as a culture (presumably on blood agar) and kept at room temperature for twelve months. It was then tested in accurate doses on pigeons and found to have retained its full virulence. It is not stated whether the culture was exposed to light.

DISEASES DUE TO FILTERABLE VIRUSES.

VALLÉE (H.) & CARRÉ (H.). **Sur l'adsorption du virus aphteux.** [The Adsorption of the Virus of Foot and Mouth Disease.]—*Compt. Rend. Acad. Sci.* Paris. 1921. Jan. Vol. 172. No. 3. pp. 185–187.

If washed ox corpuscles are added to filtrate obtained from a suspension of epithelium taken from foot and mouth disease lesions, the

virus becomes attached to the corpuscles and repeated washing and centrifuging does not free them from it. The blood corpuscles can be replaced by bacteria, such as staphylococci. The virus fixed in this way can be injected intravenously into susceptible animals in large quantities without producing the disease, but infection follows subcutaneous inoculation. The difference is explained by the difference in the rate of phagocytosis.

A single dose of adsorbed virus does not confer immunity.

An important point in connexion with the experiments is that caution must be exercised in concluding that a virus is intraglobular when microscopically nothing can be seen to substantiate that view.

SCHEIN (M.). **Dualité possible de la fièvre aphteuse. Hypothèse de travail.** [The Possible Duality of Foot and Mouth Disease.]—*Compt. Rend. Acad. Sci.* 1922. Jan. 16. Vol. 174. No. 3. pp. 204–206.

The author points out that foot and mouth disease is very variable in its manifestations. Sometimes a solid immunity is conferred and sometimes practically none. Man is sometimes infected and at other times escapes. Pigs likewise may or may not contract the infection from cattle, and the author states that on three occasions deliberate attempts to infect young pigs failed. It has been observed in practice that in some outbreaks the infectious nature of the disease is extreme, in others very slight. The period of incubation varies also within fairly wide limits.

He therefore suggests as a working hypothesis that there are in reality two specific entities included under the term foot and mouth disease. Similar dualities are known in human medicine.

GINS (H. A.) & WEBER (R.). **Ueber experimentelle Maul- und Klauenseuche.** [Experimental Foot and Mouth Disease.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1922. May 22. Vol. 88. No. 3. pp. 180–186.

The possibility of infecting guinea-pigs with at least some strains of foot and mouth disease virus has opened up possibilities of progress in the investigation of the disease. The authors have been able to do this, success in this direction having already been reported by WALDMANN & PAPE, HOBMAIER, and others. They have not been able to maintain the virus through so many passages as the first-mentioned authors. They found that the virulence decreased after the first half-dozen passages, and was lost also for naturally susceptible animals. In a few experiments the results suggested that this weakened virus was capable of multiplying in the blood of naturally susceptible animals and conferring immunity against subsequent infection. It was further found that guinea-pigs which had survived inoculation with weak virus were immune.

GINS (H. A.). **Mikroskopische Befunde bei experimentellen Maul- und Klauenseuche.** [Experimental Foot and Mouth Disease. Microscopic Investigations.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1922. June 12. Vol. 88. No. 4. pp. 265–268. With 1 plate & 2 text figs.

The author describes the presence of small bodies containing chromatin within the nuclei of the epithelial and sub-epithelial connective tissue cells in the neighbourhood of lesions produced experimentally in guinea-pigs.

LEBAILLY (C.). **La durée de la période contagiense dans la fièvre aphteuse.** [The Duration of the Period of Infectivity in Foot and Mouth Disease.]—*Rec. Méd. Vét.* 1922. Aug. 15. Vol. 98. No. 15. pp. 429–431. Also *Compt. Rend. Acad. Sci.* 1922. June 12. Vol. 174. No. 24. pp. 1580–1582.

The virus used in these experiments caused the appearance of symptoms in from 3 to 7 days. A susceptible animal placed in contact with an infected one from the first rise of temperature to the rupture of vesicles invariably became infected, the temperature rising in from 48 to 72 hours.

If, on the other hand, the susceptible animal is not placed in contact until four days after the appearance of the first vesicle, infection does not take place, even though the animals are placed in the closest possible contact. It is generally held that the risk of infection is very serious at this stage, and with a view to combating it very free use of disinfectants is advised. The author has, however, made a practice of placing fresh susceptible animals in contact with infected ones from the fourth day after the appearance of vesicles, and during a period of eight months has not observed a single case of infection. The use of disinfectants has been discontinued. The susceptibility of the contacts has been proved from a fortnight to a month later by inoculation or by exposure to natural infection.

It would therefore appear that there are two distinct stages in the course of the disease from the point of view of contagion. The first, during which animals are capable of transmitting the disease, which lasts until four days after the appearance of vesicles, and the second from that time onwards during which infectivity is absent.

The author holds that these observations indicate that slaughter is an unnecessary procedure, and offers the advice that the apparently healthy animals are more to be distrusted than those which have been salivating for four days.

VALLÉE (H.) & CARRÉ (H.). **Sur l'immunité anti-aphteuse.** [Immunity against Foot and Mouth Disease.]—*Rev. Gén. Méd. Vét.* 1922. June 15. Vol. 31. No. 366. pp. 313–317.

It has been well established that the immunity conferred by an attack of foot and mouth disease is exceedingly variable in duration, and that one of the factors concerned in this variability is the idiosyncrasy of the animal. Another factor is the quality of the virus, as has been shown in experiments in which animals recovered from an attack of the disease due to a particular strain of virus failed to become reinfected when inoculated with the same virus, but became affected when inoculated with a virus from a different source. Where reinfection took place there was a shortening of the period of incubation.

KURAGANO (S.) & MOGAMI (T.). **On the Immune Serum against Foot and Mouth Disease.**—*Jl. Japan. Soc. Vet. Sci.* 1922. June. Vol. 1. No. 2. pp. 111. [Author's English abstract.]

1. Calves subjected to natural infection proved to be immune against subcutaneous inoculation of virulent blood carried out 20–34 days after recovery. Further experiments are necessary to determine the duration of immunity.

2. Subcutaneous inoculation of blood, saliva, vesicular content and emulsion of spleen and lymphatic gland from an infected animal produced the disease in calves. The minimum lethal dose of blood for calves was 2 cc.

3. The blood serum from a recovered animal was found to have a protective action, and this could be strengthened by repeated injections of virulent blood (100, 500, 1,000 cc.).

4. The period of incubation is sometimes as short as 24 hours. It is therefore preferable to inject the serum first and the virus one or two days later.

5. Animals injected with immune serum at the rate of 0·53 cc. per kilo proved immune to 10 cc. of virulent blood three weeks later.

Cosco (G.) & Aguzzi (A.). **Studi sperimentali sull' Afta epizootica esequiti Nella R. Cascina di Poggio a Caiano (Firenze)—Giugno 1915–Ottobre 1919.** [Experimental Investigations regarding Foot and Mouth Disease carried out between June, 1915, and October, 1919.]—*La Clin. Vet.* 1922. June. Vol. 45. No. 8. pp. 1–140. With 3 plates & 10 charts.

In this paper are brought together results which have been published at different times during the period mentioned.

The length of the paper renders brief abstraction impossible.

Heslop (G. G.). **Further Researches into the Serological Diagnosis of Contagious Pleuropneumonia of Cattle.**—*Proc. Roy. Soc. Victoria.* 1922. May. Vol. 34. No. 2. pp. 180–195.

The fermentation reactions of the virus have been tested, and it has been found that it will grow in Martin's broth with ox serum to which saccharose, glucose, maltose or lactose have been added, and, further, that growth also took place in 4–5 days in media containing 2 per cent. mannite or dulcite. In neither of these cases was acid or gas produced. In fact, no gas was produced in any of the media, and only glucose and maltose were rendered acid.

Attempts were made to simplify the method of applying the complement-fixation test in that 12 different antigens were tried in turn, but with none of them were satisfactory results obtained. Agglutination tests, using the microscopic method with dark-ground illumination, were carried out, but the method was found to be valueless.

It has, however, been found that positive results can be obtained by the microscopic method if an old strain of the organism which has been passed through several generations is used. Known positive serum will cause agglutination after 48 hours' incubation in a dilution of 1 in 100, while a known negative serum will give the same reaction in 1 in 80 only. The reaction is not complete until the forty-eighth hour. Incubating the tubes at higher temperatures did not expedite the reaction. Acute cases give higher reactions than chronic ones, as a general rule, but not invariably.

The tests have so far been carried out with sera from 23 positive cases.

In three or four cases animals affected with cowpox gave reactions to the complement-fixation test with pleuro-pneumonia antigen, which were to some extent positive. Details of these tests are not given.

DORSET (M.). **A Note on the Period of Incubation in Hog Cholera.**—*Jl. Amer. Vet. Med. Assoc.* 1922. July. Vol. 61. No. 4. pp. 393–396.

The author draws attention to the discordant opinions regarding the period of incubation of hog cholera, and indicates that these opinions have been based more extensively upon field observations than upon controlled experiments. With a view to making some exact observations, 171 pigs, varying from 50 to 80 lb. in weight, were inoculated subcutaneously with 2 or, in the great majority of cases, 5 cc. of virulent defibrinated blood. The animals were under close observation daily, and a tabular statement gives the percentage of animals on each day showing a rise of temperature, the first visible symptoms, loss of appetite, and died or killed for virus.

The period of incubation is taken as the interval elapsing between infection and the appearance of visible symptoms. A rise of temperature may not actually indicate infection as the temperature of pigs is very variable.

The shortest period elapsing between infection and the appearance of symptoms, sluggishness and slight loss of appetite, was three days, and the longest seven. In more than 95 per cent. of the pigs the period ended on the fourth, fifth and sixth days.

"It is coming to be recognized that successful immunization of hogs against hog cholera is primarily dependent upon the employment of a good grade of potent virus, first, by the serum manufacturer in hyperimmunizing his hogs and in testing his serum, and, second, by the veterinarian who is administering the simultaneous treatment in the field. The suggestion is made, therefore, that careful observation of the period of incubation of the disease in pigs inoculated to secure virus for any of these purposes may assist manufacturers in maintaining a virus of high grade."

The data obtained in the experiments under report suggest that a virus causing visible symptoms in a considerable proportion of pigs by the fourth day is either very virulent or contaminated.

The results also suggest that the best results will be obtained by the use of a virus, the incubation period of which is six days or less.

KONDO (S.). **On the Anti-rabic Vaccination in the Dog.**—*Jl. Japan. Soc. Vet. Sci.* 1922. Mar. Vol. 1. No. 1. pp. 47–51.

The author carried out a number of tests with vaccines prepared in different ways and gives the results of these in tabular form. The best vaccines were obtained by making an emulsion of brain from an animal inoculated with fixed virus, and killed when completely paralysed, in 50 per cent. glycerin containing 0·5 per cent. phenol in the proportion of 1 to 5; the emulsions being subsequently kept at 37° C. for 72 hours, or at room temperature for ten days before use. The former of these appeared to be the better, as the attenuation was more constant. Rabbits' brains were used in the earlier experiments, but subsequently the brains of dogs were employed. Better results were obtained and the yield of vaccine was larger.

A single subcutaneous inoculation with 5 cc. of this emulsion is sufficient to protect a dog against an inoculation with virulent material. The author states that the immunity lasts for about a year, but in his tabular statement the longest interval elapsing between vaccination and test inoculation is 101 days.

GALLI-VALERIO (B.). **Quelques observations au sujet du diagnostic de la rage.** [The Diagnosis of Rabies.]—*Schweiz. Arch. f. Tierheilk.* 1922. May. Vol. 64. No. 5. pp. 238–241.

The author diagnosed rabies in two dogs from the discovery of fragments of straw and wood wedged between the teeth and of sugar in the urine. In one of them he was unable at first to find Negri bodies, but these were subsequently discovered and the diagnosis confirmed by rabbit inoculation.

He also found sugar in the urine of the rabbits inoculated from these dogs, with the exception of one which died two days after subdural inoculation with medulla from one of the dogs. Death in this case was due, the author believes, to intoxication produced by the injected nerve tissue. This view has been held to explain cases of paralysis in human beings under treatment, but it has been found by REMLINGER that normal nerve tissue can produce neuro-toxic symptoms. Whatever be the explanation it is of importance, because a diagnosis of rabies must not be made because an inoculated rabbit dies soon after inoculation and before the presence of Negri bodies has been established or before another rabbit has been inoculated from it, and because it must be remembered that inoculated rabbits may die from this neuro-intoxication, and several therefore should be inoculated with the suspected material.

Moreover, the author states that the rabbit which died so shortly after inoculation showed symptoms resembling those of furious rabies. REMLINGER has noted the occurrence of similar symptoms in such cases.

The author advises direct inoculation into the substance of the brain in preference to subdural inoculation. He has had very good results with the following procedure. A stiff metal probe has wrapped round its end a pledget of cotton wool soaked in an emulsion of virus. This is then passed up the nostrils of the rabbit as far as the cribriform plate, where it is rotated, thus causing inoculation into the olfactory filaments.

BLANC (G.), MÉLANIDI (C.) & CAMINOPETROS (J.). **Recherches expérimentales sur une maladie eruptive de la chèvre observée en Grèce.** [Experimental Investigation of an Eruptive Disease of the Goat in Greece.]—*Ann. Inst. Pasteur.* 1922. Aug. Vol. 36. No. 8. pp. 614–618.

This disease is believed by the peasants to be caused by certain plants, among which is *Hypericum hirsutum*, which is known both in Northern Africa and in Greece on account of its phototoxic properties. The authors, however, claim to have proved the disease to be due to a virus belonging to the cowpox-sheeppox group.

FREI (W.). **Zur physikalischen Chemie der filtrierbaren Krankheitserreger.** [The Physical Chemistry of the Filterable Viruses.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1920. Sept. 15. Vol. 46. Nos. 3 & 4. pp. 103–139.

NICOLAS (E.) & RINJARD (P.). **La vaccination des Bovidés contre la peste bovine.** [The Inoculation of Cattle against Rinderpest.]—*Compt. Rend. Acad. Sci.* 1921. Dec. 19. Vol. 173. No. 25. pp. 1428–1429.

PAUCERA (A.). **Casi di afta trasmessa da bovini all' uomo e comportamento de virus riportato in animati sensibili.** [Cases of Foot and Mouth Disease in Human Beings.]—*La Clin. Vet.* 1922. May. Vol. 45. No. 6. pp. 251–254.

RIES (J. N.). **Sur le Diagnostic différentiel de la Peste Bovine.** [The Differential Diagnosis of Rinderpest.]—*Rev. Gén. Méd. Vét.* 1922. July 15. Vol. 31. No. 367. pp. 396–399.

MYCOTIC DISEASES.

FONTOYNONT (M.) & SALVAT (P.). **Sur une Actinomycose du Rat à Madagascar.** [Actinomycosis of the Rat in Madagascar.]—*Bull. Soc. Path. Exot.* 1922. July. Vol. 15. No. 7. pp. 596–607.

The first case of this infection was a rat caught at the Pasteur Institute at Antananarivo.

The lesions were abscesses along the tail and ulceration of the scrotum, the testicles were fibrous and contained cavities with viscous, creamy, yellow pus.

The left eye was very prominent, and the pupil was opalescent and yellowish-white in colour. The right eye showed only a small spot of opacity.

The peritoneum and mesentery were riddled with small abscesses. The pleura and pericardium were covered with miliary granulations.

In the pus the organism occurred in the form of small bacilli, cocco-bacilli or shuttle-shaped forms, only the walls of which took ordinary stains; it is Gram-negative and not acid-fast. Leishman's stain appeared to be the best.

Emphasis is laid on the fact that the organism is scarcely visible in smears of pus save in the very thinnest parts.

In cultures the organism is found to be composed of branching filaments which are sometimes slender and sometimes clubbed. They frequently have fragmented appearance, thus appearing as a chain of short bacilli or cocci.

The mycelium disappears rapidly in cultures, and only fragmented forms, rods, cocco-bacilli, etc., are found. These forms, the author believes, are not viable, as cultures are not obtained from pus which contains no mycelium. The failure of the various forms to take stains throughout is explained by the author on the grounds that they contain no protoplasm, only the empty envelopes becoming stained.

The optimum temperature for growth appears to be 37–38° C., but even at this temperature it is slow, a month being required to produce visible growth. Growth was always more luxuriant in tubes which were closed with rubber caps.

In primary cultures on such media as glycerin, glucose, or maltose agar, serum, and glycerinized carrots the colonies do not exceed 2 mm. in diameter, but under subcultivation luxuriant growths are obtained.

Details are given of the appearance of cultures on half a dozen of the media used.

After intraperitoneal inoculation with emulsion of pus, rabbits, guinea-pigs and rats died of acute intoxication within 48 hours.

By ingestion a chronic form of the disease was produced with the development of numerous abscesses. Small doses of pus injected intraperitoneally produced the same effect.

BOUCHER & CAROUGEAU. **Premier cas de Sporotrichose à *Sp. gougeroti* observé sur un cheval à Madagascar.** [The First Observed Case of Equine Sporotrichosis due to *Sp. gougeroti*.]—*Rev. Gén. Méd. Vét.* 1922. May 15. Vol. 31. No. 365. pp. 249–254.

The animal was a six-year-old stallion which had had persistent nasal discharge and enlarged glands for about two months before it came under the authors' observation. The general condition was good.

Examination of the nose revealed the presence of several sharply defined but irregularly shaped ulcers on the septum. These varied in

depth, the deepest reaching the cartilage. They ranged from 1 to 3 cm. in diameter. The bases were covered with more or less adherent crusts, and when these were removed were found to have a downy appearance. The involved glands were as large as eggs, hard, and freely movable. There were a number of subcutaneous nodules varying in size from a pea to a nut above the angle of the mouth on each side.

Sporotrichosis was suspected, as there has been no glanders in Madagascar for many years, and an intrapalpebral test with mallein yielded a negative result. Pure cultures of *Sp. gougeroti* were obtained from the lesions on glucose agar.

Treatment with potassium iodide (15 g. daily) led to complete recovery in three weeks.

On glucose agar growth was visible as a black speck after 24 hours [temperature not stated]. By the third day the growth presented an appearance resembling the skin of a black mouse. After a week the growth was 5 mm. thick and from the fifteenth day showed a black non-filamentous border. Maximum growth was obtained after about a month.

On maltose agar there was a small amount of greyish-black growth on the second day, and two days later it was dotted with dry black spots, which caused it to resemble a mushroom. The development of filaments during the succeeding days masked this appearance.

Glucose gelatin.—Similar to those on glucose agar, but the colonies were greyish in colour, and on the second day showed a narrow white border. While the surface of the colonies remained greyish in colour, the deeper parts were black. Subsequently white filamentous outgrowths were observed growing into the substance of the medium.

Glucose broth.—On the second day there was slight turbidity, particularly at the bottom of the tubes. The following day a number of black specks were visible in the tube at the level of the surface of the liquid. Subsequently colonies developed on the surface of the medium and a small amount of black deposit at the bottom of the tubes. After a month there was a complete film on the surface of the broth, which had become clear, and a black sediment covered with a white albuminous layer 3 cm. in thickness.

The growth on potato was similar to that on other solid media.

The microscopic characters of the organism vary with the age of the culture. On the first day filaments composed of three or four oval elements measuring up to 20μ long and provided with thick double-contoured membrane are seen. On the second day long slender filaments composed of rectangular cells 2μ in thickness developed. On the following day lateral oval spores are found on these. By the fifth day moniliform filaments occur, with clusters of spores round the nodes, and on the following day spores are very abundant and short unicellular conidiophores giving rise to bunches of spores can be found.

Rats and rabbits inoculated subcutaneously died after periods ranging from a fortnight (in the case of the former) to four months (maximum of two rabbits); from some of the glandular lesions cultures were recovered.

One guinea-pig inoculated yielded a doubtful result.

Colin (M.). **Traitement chirurgical de la lymphangite épizootique.** [Surgical Treatment of Epizootic Lymphangitis.]—*Rec. Méd. Vét.* 1922. Aug. 15. Vol. 98. No. 15. pp. 431–436.

*Fontoynont (M.) & Carougeau. **Abcès sous-dermique et gommes ulcérées produits par le *Sporotrichum carougeaui* Langeron 1913, associé à la tuberculose chez un enfant malgache.** [Subcutaneous Abscess and Ulcerating Gumma caused by *Sporotrichum carougeaui*, associated with Tuberculosis in a Madagascan Child.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 445–453.

*Langeron (M.). **Un nouveau Sporotrichum malgache : *Sporotrichum carougeaui* Langeron 1913, et remarques sur les Sporotrichés.** [A New Madagascan Sporotrix : *Sporotrichum carougeaui* Langeron 1913, and Remarks on the Sporotriches.]—*Bull. Soc. Path. Exot.* 1922. June. Vol. 15. No. 6. pp. 453–459.

* Work dates from 1911. Publication delayed by the war.

MISCELLANEOUS.

Panisset (L.) & Havet (G.). **La proportion des Eosinophiles dans le sang des Bovidés.** [The Percentage of Eosinophile Leucocytes in Bovine Blood.]—*Compt. Rend. Soc. Biol.* 1922. Feb. 4. Vol. 86. No. 5. pp. 260–261.

The percentage of eosinophiles generally given for bovine blood is 1–2, but the authors have made a large number of examinations, and their average percentage is 11·7, with 5·4 and 18·6 as the minimum and maximum. The number varies not only from animal to animal, and from time to time in the same animal, but from preparation to preparation made from a single sample of blood.

To ensure, as far as possible, the absence of parasites which might have been responsible for eosinophilia, the urine and faeces of some of them were examined and precipitin tests for hydatid cysts were carried out.

In calves 1–2 per cent. is the normal.

Scharrer (R.). **Bovine Staggers or Pushing Disease in Natal.** —*Jl. Comp. Path. & Therap.* 1922. June. Vol. 35. No. 2. pp. 125–132. With 1 text fig.

Animals other than cattle can eat large quantities of *Matricaria nigellaefolia* without presenting the symptoms presented by the latter. They may, however, show irritation of the sexual organs, gastro-enteritis and nephritis.

The author has found that the toxicity of Matricaria is in direct relationship to the intensity of its scent. The scent appears to vary either with species or with locality. The primary symptoms of irritation which may be observed in all species of animals are, the author believes, the direct result of the essential oil present in the plant. The use of the plant thoroughly dried as hay or artificially dried is not responsible for the production of symptoms. The true " pushing " symptoms are not produced by feeding the dried plants. The peculiar susceptibility of the ox and the delay in the development of symptoms lead the author to think that the poisonous substance is not present in the plants as such, but comes into existence as a result of the breaking down of more complex substances. The toxic substance is probably eliminated slowly. The loss of condition he believes is due to the decomposition of the animals' own albumen in order to neutralize the toxin. " If the total amount of the Matricaria eaten is small, or the administration of large doses is spread over a sufficiently long period, the toxic

analytical product can be neutralized by a certain chemical radical which is formed in the splitting up of the albumen of the body or food, and it can then be excreted in the urine." Pushing disease can therefore be prevented by giving foodstuffs containing much albumen, or the chemical radical which neutralizes the toxin after the albumen is broken up.

The incubation period is the direct indication of the amount of the plant eaten.

The acid reaction of the juice of Matricaria excludes the possibility of the presence of free alkaloids, and the improbability of free alkaloids being present is emphasized by the length of the period of incubation. The author thinks that the toxic substance must be an aromatic glucoside. By fermenting the glucoside in watery extract the author isolated the toxin, and his tests yielded results which were characteristic of phenol, and he states that carbolic acid produces exactly the symptoms of pushing disease in cattle, as they are unable to excrete it, as are other animals. Phenol can be identified in the carcasses of animals dead of pushing disease, and particularly in the nervous tissues.

With a view to effecting chemical combination with the phenol the author advises the administration of sodium hydrogen sulphite. The salt should be given 1 oz. twice daily in their drinking water (six pints) while they can drink. Drenching should not be practised, as there is partial laryngeal paralysis. For intravenous injections ½ oz. of sodium bisulphite in 200 cc. of water (sterile) at 100° F. are given. The injection should be made into the saphena vein with a view to lessening shock.

DODD (S.) & HENRY (M.). **Staggers or Shivers in Live Stock.**—*Jl. Comp. Path. & Therap.* 1922. Mar. Vol. 35. No. 1. pp. 41–61.

Staggers or shivers is the name given in certain parts of New South Wales to a diseased but non-contagious condition seen in horses, cattle and sheep in those areas.

It has not been proved that the condition is identical in the three species, but it appears to be probable that it is. The present paper deals with the disease as it is observed in sheep.

The condition appears to be confined to the flats along the Namoi river and its tributaries. These areas are subject to flooding and are, for the most part, practically devoid of grass, but covered after the rains with such plants as crowfoot, trefoil, thistle and mallow.

Age and sex appear to have no influence on the incidence of the disease, but it is said to be more severe in young animals. Even sucking lambs and foals may be affected. The disease is generally more in evidence after a good rainfall, but it has been seen in a dry season when only dried herbage was available.

The histories of outbreaks of the disease appear to have the common factor of sheep developing symptoms of staggers when called upon to make any effort, such as a journey. If the animals are rested recovery takes place; but some may die. The first symptoms which may be observed when the animals have travelled only a few hundred yards or after some miles are: stiffness of the hind legs, arching of the back, and head stretched out. Respiration is rapid and shallow and the pulse quick. If the affected sheep are urged, more or less extensive trembling of the muscles is seen. Then collapse occurs. If left alone they will get up and walk away, but if urged again death may occur. The temperature may range from 104–106° F. Sensory reflexes are absent, and there is no evidence of pain.

There are no lesions which can be ascribed to the disease itself. Attempts to transmit it by inoculation or contact have failed. It was first established experimentally that the disease was associated with a certain piece of land, which had previously been suspected of being causally connected with the condition.

The first evidence of the disease was observed in one lamb when the experimental animals were driven round the paddock two days after their introduction. The following day a number of them were affected. At this time there was a large amount of mallow in the paddock. An attempt was made subsequently to confirm this experiment with sheep brought from a distance. The disease did not make its appearance. This failure is explained by the fact that there were other plants such as trefoil in the meadow in plenty, and that the mallow was left untouched.

A number of feeding experiments were carried out in various ways, and from these the following inferences were drawn. Lambs are more susceptible to the toxic principle than adults; the toxin is conveyed to the lambs through the ewes' milk; either large quantities of the plant are necessary to produce symptoms in adults, or the plant is not so toxic in its early stages of growth.

In another experiment carried out with the cut plant carried to a distance and fed about 24 hours after cutting, lambs only were affected, and then after 24 days.

Evidence was obtained in one experiment that lambs which have been affected and have recovered are capable of becoming infected again when fed upon mallow.

Experiments designed to provide an answer to the question as to the stage at which the mallow was most toxic gave inconclusive results.

In view of the failure to cause symptoms in adult sheep in the above series of experiments a second set were carried out on similar lines, and symptoms were produced.

The view has been held by stockowners that *Lamium amplexicaule* (Labiatae) is also capable of producing symptoms of staggers, and experiment gave confirmation to this view; the plant would appear to be more potent than the mallow in that symptoms were produced in adults.

No evidence of fungus or other parasite of the mallow being responsible for the symptoms produced could be obtained.

No investigations regarding the nature of the toxic principle have been carried out.

As an addendum to the above article there is an extract of a letter headed "Injurious Effects of Malva Plant," by HESTER, which appeared in the *American Veterinary Review*, 1906, Vol. 30, p. 106. From this it appears that mallow (*Malva borealis*) was responsible for symptoms of staggers in horses in California.

MITCHELL (C. A.). **Preliminary Report on Equine Botulism in Canada.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Vol. 61. No. 6. pp. 609–619.

The first suggestion that botulism might occur in animals was made by PEARSON in 1901, but no further investigations were made along these lines for many years because it was not known that *B. botulinus* might be a contaminator of foods other than meat, and because a number of investigators claimed to have detected the causal organisms of conditions variously known as forage poisoning, cerebrospinal meningitis, blind staggers, etc.

In 1918 the presence of *B. botulinus* on certain forage which had caused intoxication was detected by GRAHAM, BRUECKNER and PONTIUS.

BURKE in 1919 carried the work further, and amplifying that of DICKSON showed that there are two types, the antitoxin of either of which would not neutralize the toxin of the other. The author states that cases investigated in 1919, which had been diagnosed as cerebrospinal meningitis, he now feels sure were cases of botulism.

In October, 1921, four horses became ill simultaneously and all died within 24 hours. None of the others showed symptoms. A fortnight later a freshly purchased horse and the three remaining original ones became ill suddenly, presenting the same symptoms, and died within 30 hours. The only food common to all was hay. The water supply had been changed.

The lesions found were inconspicuous. The blood was dark and did not coagulate readily. The lungs, liver, spleen and kidneys were normal. The adrenals were slightly congested, as were the stomach and intestines. There was general engorgement of the cranial vessels.

The brain and cerebrospinal fluid yielded no growths on artificial media save for a few diplococci from the latter. These were non-pathogenic for guinea-pigs.

In anaerobic cultures from the intestines, growths were obtained of a bacillus which appeared to be *B. botulinus*. Subcultures were obtained in liquid media, and these, when freed from the bacteria by centrifuging, were found to be toxic. 0·2 cc. given intraperitoneally killed guinea-pigs, as did twice that dose given *per os*.

The characters of the organism were as follows: (1) strict anaerobe; (2) Gram-positive; (3) bacillus with rounded ends; (4) terminal spores wider than the bacillus; (5) short chains in liquid media; (6) grew well at 28° C., not so well at 37° C.; (7) produced a disagreeable rancid odour and gas; (8) produced a powerful toxin.

Experiments carried out with antitoxins of the A and B types showed that the organism was *B. botulinus* type B.

A culture was grown in "minced-meat medium" for 16 days at 28° C. This was centrifuged and 5 cc. of the liquid were given to a horse *per os*. [The minced-meat medium was made by mixing equal weights of finely minced ox heart and water and cooking slowly. Normal soda was then added until the reaction was markedly alkaline to litmus. This was then autoclaved at 120° for an hour on three successive days.] For three days the horse appeared to be quite healthy. On the fourth day the following symptoms were noted: extreme difficulty in swallowing, salivation, dilatation of the pupils, ptosis, and extreme weakness. There was no sensory paralysis, and pulse and temperature were practically normal throughout. Only the head was examined post-mortem, and extreme congestion of the brain was observed. Smears from the brain revealed no bacteria and guinea-pig inoculations were negative.

The second experiment was carried out on an old horse affected with the "heaves" [? broken wind]. This animal was given 5 cc. of filtered toxin on oats. On the third day it collapsed and died suddenly. There were no very marked abnormalities found, but capillary congestion of the heart, lungs and abdominal viscera were the most pronounced.

In an experiment in which guinea-pig brain tissue was mixed with toxin, and the mixture injected into guinea-pigs after it had been

incubated for five hours, the results indicated that there was no fixation of the toxin by the nerve tissue in that length of exposure.

It was found possible to precipitate the toxin with alcohol.

In an experiment with chickens the birds were found to be immune even to large doses, but guinea-pigs fed with food contaminated with excreta from the birds died.

The eggs of a fowl fed with toxin were not found to contain any. This is important in view of the use of raw eggs for children and invalids.

Production of toxin in vegetable media.—Oats were sprouted until they were about 4 in. long. The sprouts were clipped off, washed in sterile water and then packed firmly with glass rod in sterile tubes until the liquid expressed covered the surface of the pulp. Several such tubes were inoculated with *B. botulinus*. They were incubated at 28° C. for 10 days. *B. botulinus* was found along with moulds and yeasts, while the latter only were found in unsown control tubes. The liquid from the inoculated tubes killed guinea-pigs in doses of 0·5 cc. Liquid from control tubes was without effect. Clinical experience suggests that in hay *B. botulinus* is not distributed through a crop, but in pockets here and there.

WATSON (E. A.) & HEATH (L. M.). **Studies of Biological Preparations by Complement-Fixation Methods. 1. Mallein : Antigenic Variations and a Proposed Method of Standardisation.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Aug. Vol. 61. No. 5. pp. 503–514.

Attention is drawn to the widely exploited preparations for the diagnosis, treatment and prevention of animal diseases, and their possible value for these purposes is commented upon, and the authors indicate the different procedures which they have tried with a view to arriving at some method of general standardization.

In this paper mallein standardization investigations are described.

They came to the conclusion that such products as mallein and tuberculin sera, vaccines, etc., could best be standardized by complement-fixation methods.

They found that horses treated with mallein yielded the best anti-mallein serum, and that the immunity was temporary, the antibodies disappearing in about a month. They could be restored by a fresh injection.

The antiserum was found to be specific. It yielded no reactions with products of other diseases, *e.g.*, tuberculin, nor with culture media.

IIZUKA (A.). **On the Disinfection of Animal Hairs.**—*Jl. Japan. Soc. Vet. Sci.* 1922. June. Vol. 1. No. 2. pp. 85–91. With 1 plate.

It having been found that boiling, steaming and autoclaving hair either damaged it or were objectionable for other reasons (slow drying, etc.), the author experimented with methods involving the use of formaldehyde gas *in vacuo*.

The general method in the preliminary experiments was to enclose bundles of horse-hair, within which were threads impregnated with anthrax spores rolled in paper, in a double-walled vessel. Hot water was placed in the outer space ; it was kept at various temperatures in different instances for varying periods. The air within the vessel was then partly exhausted until the mercury manometer showed 3 cm. A solution of formalin 1 to 3 or 1 to 2 with water was poured in and the temperature maintained for a definite period.

The thickness of the bundles, the tightness of tying and the presence of dirt in the hair affected the results.

The anthrax threads removed from a bundle of hair 3 in. in diameter which had been exposed to the vapour of a 50 per cent. solution of formalin at 80° C. for three hours yielded cultures of anthrax subsequently. Similar bundles were effectively disinfected when the formalin solution was 1 to 4, the temperature 95–98° C., and the period half an hour.

Experiments were also carried out with an apparatus produced by a commercial firm termed the S.K. type vacu-form apparatus. The apparatus comprised a disinfection chamber with lead pipes on its inner side of a capacity of 15 cu. ft., formaldehyde producer, vacuum pump and boiler.

Steam is first passed through the lead pipes from the boiler, thus heating the disinfection chamber. The chamber and formaldehyde producer are then exhausted until the vacuum gauge indicates 29 in. Formaldehyde and vapour [water vapour] are then passed into the chamber and the temperature maintained for the required time.

The bundles of hair containing the anthrax threads and a considerable amount of dirt were placed in a box with a number of holes in its sides. Disinfection was incomplete when undiluted formalin was used, and the temperature kept at 85° C. for three hours. It was complete when formalin solution 1 to 4 was used and the temperature kept at 100° C. for half an hour.

Results apart from disinfection.—At temperatures below 100° the hairs are less moist. White or coloured hairs do not change colour or lose lustre. By steam disinfection white hairs become yellow. There was no loss of tenacity as shown by ascertaining the breaking strain and comparing with controls. Hairs disinfected by this method are difficult to bleach. The use of formalin prevents disinfected hairs from becoming musty if stored in a moist state.

Large apparatus constructed on very similar, but not exactly the same, lines were tested before being put into use.

The materials used were a little different in different cases :—

1. Horse hair was pressed down into a hole in a piece of wood and anthrax threads were buried in it at various depths. In a similarly planned experiment a piece of lead tubing was used instead of wood. The temperature was kept at 100° for one hour and formalin solution 1 to 4 used. The spores were killed to a depth of 5 in. from the surface.

2. Conditions.—Temperature 85° C., formalin solution 1 to 2, time 1½ hours. Bundles of horse hair 2 in. in diameter and masses of hair 3 in. thick, each containing anthrax threads in their centres, were used. Both were disinfected when placed in the upper part of the chamber, but only the latter when placed in the lower part.

The superiority of the laboratory apparatus as compared with the commercial one is explained as follows. In the laboratory apparatus the chamber was small and heated from below, the bottom thus being hotter than other parts. This caused re-vaporization of any formalin falling to the bottom. In the other apparatus the heating was from the top, and when the temperature was 85° the upper part of the wall of the chamber was at nearly 100° C. and the lower part at 68° C. This excessive heating of the upper part caused the formalin to be overheated, diluted and reduced in total quantity. " On the other hand, the hairs absorb much formalin, so that the greater part of the early saturated formaldehyde is absorbed by the superficial portion of the bundle," and penetration is not complete, although penetration by heat is complete.

SUZUKI (S.). **Application of Papain in the Preparation of Culture Media.** —*Jl. Japan. Soc. Vet. Sci.* 1922. June. Vol. 1. No. 2. pp. 81–84. (In Japanese with English abstract.)

The technique described has been designed to obviate the necessity of adding peptone to media or, alternatively, the use of complex methods involving the use of digestive ferments of animal origin.

1. For general use. Mix one pound of horse-flesh or beef with 1 litre of water. Add 1·5 gm. of papain and boil or steam. As the temperature passes 85° C., 70 per cent. of the protein of the meat is converted into peptone. Filter and wash the residue with water. Mix water with the filtrate and make up the volume to 3 litres. Add 30 gm. of salt. The mixture contains about 2 per cent. of peptone.

2. For preparing materials for immunization. As above, save that the quantity of papain is reduced to 0·5 gm. and the total bulk made up to 1 litre. The peptone content is about 5·4 per cent.

COOLEY (R. A.). **Fourth Biennial Report of the Montana State Board of Entomology, 1919–20.** Helena. 1921. Jan. pp. 1–17.
PARKER (R. R.). **Report of Tick Control Operations in the Bitter Root Valley during the Seasons 1919 and 1920.**—*4th Bienn. Rept. Montana State Bd. Ent., 1919–20.* Helena. 1921. Jan. pp. 18–44. [Summarized in *Rev. App. Entomol.* 1922. June. Vol. 10. Ser. B. No. 6. pp. 123–124.]

Efforts have been concentrated on the control of *Dermacentor venustus*. This tick infests rodents in the larval and nymphal stages, and larger animals in the adult phase. The ground squirrel is the most frequent host of the immature ticks, but the rock squirrel, chipmunk, wood rat, weasel, snowshoe rabbit, cottontail rabbit and prairie dog are also susceptible to infection. Importance attaches to the possible responsibility of these species as reservoirs.

The eggs are laid in the spring or early summer. The larvae feed upon rodents for a number of days and then drop off. They remain quiescent till the following spring, when they appear as nymphs. These repeat the history of the larvae, save that the period of engorgement is a day or so longer. A second period of quiescence lasts until the following spring, when the adults appear. Ten days is the minimum period required for the engorgement of adults. Adults which fail to secure a host may survive for periods up to four years.

It has been found that dressings of kerosene or turpentine and lard serve to free animals from ticks " for long periods." Raw cottonseed and linseed oils also show promise for this purpose.

WELLS (R. W.), BISHOPP (F. C.) & LAAKE (E. W.). **Derris as a Promising Insecticide.**—*Jl. Econ. Ent.* 1922. Feb. Vol. 15. No. 1. pp. 90–95.

In this paper are described experiments in which powdered roots of *Deguelia* (*Derris*) *elliptica* were used against Mallophaga, including *Trichodectes scalaris* on cattle; Anoplura, including *Linognathus vituli*, L., and *Solenopotes capillatus*, End., on cattle, and *L. setosus*, Olf., on dogs; and *Ctenocephalus canis*, Curtis, and *C. felis*, Bch., on dogs and cats, and *Echidnophaga gallinacea*, Westw., on dogs.

The minimum dose required per animal to kill all fleas on various breeds of dogs was found to be 0·87 gm. of a mixture of derris and maize starch in equal parts. One treatment proved to be efficient for the

destruction of all stages of Anoplura on cattle and dogs. It was also very efficient against Mallophaga on cattle and fowls, but not quite so effective on cattle as sodium fluoride. An ointment, consisting of one part of derris and two parts of vaseline, was applied to the orifices of warbles due to *Hypoderma lineatum*. In five days all the larvae were killed. Practically all the larvae were killed by a wash consisting of 1 lb. of derris, 4 oz. of soap and 1 gal. (U.S.) of water applied with a brush to the backs of infested cattle.

ROUBAUD (E.). **Les mouches Tsétsé en Afrique Occidental Française. Nos connaissances actuelles sur leur histoire et leur rôle pathogène** [The Tsetse-Flies of French West Africa. The Present State of Knowledge regarding their History and Pathogenic Powers.]—*Bull. Comité Etudes Hist. & Scientif. Afr. Occ. Française.* Paris. 1920. July–Sept. No. 4. pp. 257–300. 1 map. 7 figs. [Summarized in *Rev. App. Entomol.* 1922. June. Vol. 10. Ser. B. No. 6. pp. 117–118.]

This paper contains a map showing the distribution of tsetse-flies and trypanosomiases in French West Africa. The importance of Glossina lies in the fact that the life of the country is dependent upon the raising of cattle, and that flies of this genus live entirely on blood. Cold-blooded animals are attacked when others are not available, but the author has confirmed KLEINE's observation that flies living upon cold-blooded animals soon lose their fertility.

A key is given to the species of Glossina found and their distribution and habits are described. Seasonal migrations and the influence of meteorological conditions are explained. Their distribution is not entirely based upon conditions of vegetation or climate. *G. pallicera* and *G. fusca* are almost entirely limited to forest conditions. *G. tachinoides* and *G. longipalpis* are essentially bush species, but may be found in forest zones. *G. morsitans* is essentially the big-game fly, and hence is found in the plains. *G. palpalis* is frequently found in proximity to villages.

It has been found that the same species of Glossina is not capable of transmitting a given virus in every locality where it occurs. Nor are the trypanosomiases found to exist in different areas in proportion to the number of flies present, and in only a small proportion of flies which feed on an infective host does the parasite develop and become capable of infecting another host.

Clearing of land at suitable places has done much to reduce the fly population in those parts, and the process might be carried out in other favourable places.

GERLACH (F.). **Serumkrankheit bei Rind und Pferd.** [Serum Sickness in Cattle and Horses.]—*Zeitschr. f. Immunitätsforsch. u. Experim. Therap.* 1. Teil. Orig. 1922. Mar. Vol. 34. No. 1/2. pp. 75–94. With 4 charts & 2 text figs.

MENDELEEF (P.). **Rapport entre les Propriétés Cytotoxiques et anaphylactiques des sérums et leur teneur en ions H libres.** [The Relationship between the Cytotoxic and Anaphylactic Properties of Sera and their Content of Free Hydrogen Ions.]—*Compt. Rend. Soc. Biol.* 1922. Mar. 4. Vol. 86. No. 9. pp. 504–506.

STENT (S. M.). **Dubbeltje** (*Tribulus terrestris*) **and Geeldikkop in Sheep.**—*Jl. Dept. Agric.* (*Union of South Africa*). 1922. June. Vol. 4. No. 6. pp. 548–551. With 1 fig.

BOOK REVIEW.

SCOTT (William) [F.R.C.V.S.], with the collaboration of various writers. **An Indexed System of Veterinary Treatment.**—pp. xi + 636. With 195 illustrations. 1922. London: Baillière, Tindall, & Cox. [Price 31*s.* 6*d.* net.]

In this volume of some six hundred pages, the author has aimed at describing the treatment of "all, or nearly all, the diseases that animal flesh is heir to," and the methods of treatment described are said to be based upon "modern pathological and medical thought, supported by practical experience." Johne's disease (pp. 247–250) is said to be an unsatisfactory disease from a curative point of view, yet the author claims to have had satisfactory results during a period extending into "some years" from the administration of human urine in doses of one to three gallons in gruel night and morning. "No explanation is offered upon the therapeutical value of the urine, but it is a recognized fact that opsonins in considerable quantity leave the system by the urine, and a phagocytosis may be thereby stimulated by its ingestion."

Active immunization with full doses of Johne's bacillus vaccine is said to be worthy of an extended trial. One wonders where is the evidence to support this statement.

Joint evil (page 251). It is the author's experience that careful attention to the navel is valueless for the prevention of joint evil if the foal possesses a predisposition to the disease. It is to be regretted that the author gives no indication as to how this predisposition may be recognized. Tuberculosis (pp. 570–574) is, in the author's opinion, in many instances one of the most curable diseases with which the veterinary surgeon is called upon to deal, and two pages are taken up with the description of curative measures.

It is recommended that "open" pulmonary tuberculosis should be treated by means of a vaccine prepared from the organisms present in the expectorate to which tuberculin has been added.

The get-up of the book is up to the publishers' usual high standard.

A. L. Sheather.

MAGUIRE (L. C.) [F.R.C.V.S.]. **Vaccine and Serum Therapy in Veterinary Practice.**—pp. viii + 127. 1922. London: Baillière, Tindall, & Cox, 8, Henrietta Street, Covent Garden. [Price 5*s.*]

The first half of this small volume contains an outline of what has been published regarding what may be called the generalities of immunity, and in the remaining seventy pages the measures that have been devised for the control or treatment of some thirty diseases of animals are briefly described.

A. L. Sheather.

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